HELMINTHOLOGICAL ABSTRACTS

VOL. 26

incorporating
BIBLIOGRAPHY OF HELMINTHOLOGY
For the Year 1957

COMMONWEALTH BUREAU OF HELMINTHOLOGY
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HELMINTHOLOGICAL ABSTRACTS

INCORPORATING BIBLIOGRAPHY OF HELMINTHOLOGY

FOR THE YEAR 1957

Vol. 26, Part 1

1—Agricultural Gazette of New South Wales.

a. ANON., 1957.—" Stomach worm control." **68** (1), 33.
b. ANON., 1957.—" New plant diseases." **68** (1), 41–43.
c. ANON., 1957.—" Sparganosis—a disease danger from wild pigs." **68** (2), 86.

(1a) For the control of stomach worms, sheep in New South Wales should receive a drench during the latter part of January or the beginning of February no matter how often they have been drenched during the previous few months or in what condition they are. R.T.L.

(1b) *Aphelenchoides olesistus* as a cause of disease in *Bergenia ligulata* and *Blechnum cartilagineum* is now recorded for the first time in New South Wales. R.T.L.

(1c) Human sparganosis in New South Wales has been reported on several occasions. The definitive hosts of the adult *Spirometra* sp. are cats, dogs and foxes. The spargana have now been found in wild pigs. In a recent consignment slaughtered at Homebush saleyards more than fifty carcasses were found to be infected. Spargana from one of the pigs were transferred by feeding to a rabbit. On many properties in the region where there are wild pigs the life-cycle is perpetuated by the use of raw pig meat as food for cats and dogs. The marketing of wild pigs for human consumption is deprecated. R.T.L.

2—Agriculture. London.

a. BROWN, E. B., 1957.—" Lucerne stem eelworm. A serious threat to lucerne growing." **63** (11), 517–520.

(2a) Brown, who first recognized stem eelworm (*Ditylenchus dipsaci*) in lucerne in England in 1948, now reports that seventy fields mostly in the eastern counties were found to be infected between 1954 and 1956. Whereas the early infections had been introduced in Hungarian seed, later introductions have come in with French varieties. As field eradication is difficult, seed should be fumigated with methyl bromide in closed airtight containers and carried out under expert supervision owing to its poisonous character. The eelworm can survive in a dried state in lucerne hay for many months but a more important mode of dispersal is by pieces of infected lucerne carried from field to field on implements. Although two American lucerne varieties, Nemastan and Lahontan, are resistant they are not entirely suited to conditions in England. R.T.L.

3—American Journal of Hygiene.

a. CHERNIN, E. & MICHELSON, E. H., 1957.—"Studies on the biological control of schistosome-bearing snails. III. The effects of population density on growth and fecundity in *Australorbis glabratus*." **65** (1), 57–70.
b. CHERNIN, E. & MICHELSON, E. H., 1957.—" Studies on the biological control of schistosome-bearing snails. IV. Further observations on the effects of crowding on growth and fecundity in *Australorbis glabratus*." **65** (1), 71–80.

(3a) Under standard conditions of environmental volume of water the fecundity and rate of growth of individual *Australorbis glabratus* were reduced as the population density

increased. But no explanation of the phenomena was obtained from a comparison of the chemical analyses of the water in which small or large snail populations were kept. It is pointed out that if transient field control measures fail to eradicate a molluscan focus the enhanced fecundity of the survivors could rapidly restore the population to its previous level and that the rapid growth of a colony in the laboratory largely depends on the number of molluscs per unit of water. R.T.L.

(3b) Chernin & Michelson found that in a constant volume of water the growth and fecundity of *Australorbis glabratus* was greatly affected by increasing population density. However, when the snail population was kept constant and the volume of water reduced, similar results were not obtained. When the size of the population and the volume of water were adjusted so that the volume of water per snail was the same in populations of 25 and 50 snails the smaller population grew more rapidly. W.P.R.

4—American Journal of Tropical Medicine and Hygiene.

a. ARAFA, M. A., BIBAWI, E. & RAAFAT, A., 1957.—" The portal pressure in hepatic fibrosis associated with bilharziasis." **6** (1), 108–113.
b. EHRENFORD, F. A., 1957.—" Canine ascariasis as a potential source of visceral larva migrans." **6** (1), 166–170.

(4a) In 74 cases of hepatic fibrosis associated with *Schistosoma mansoni* infection the intrasplenic pressure had a direct linear relation with the portal pressure. Measurement of percutaneous intrasplenic pressure in conjunction with percutaneous spleno-portal venography is of great value in the diagnosis of portal hypertension and in revealing the veins suitable for portocaval anastomosis. R.T.L.

(4b) In view of the increased importance of canine ascarids as the cause of visceral larva migrans in man, the incidence, seasonal variation, host sex specificity and host age preference of *Toxocara canis* in 1,465 dogs were investigated. In dogs between three and six months old the incidence was high. Mature dogs were less frequently infected. In males the seasonal incidence was highest in the winter months while in females it was fairly uniform throughout the year. 31% of the males were infected as compared with 4·9% of the females. R.T.L.

5—American Journal of Veterinary Research.

a. DOUVRES, F. W., 1957.—" Keys to the identification and differentiation of the immature parasitic stages of gastrointestinal nematodes of cattle." **18** (66), 81–85.
b. LINDQUIST, W. D., 1957.—" The use of low level piperazine on pigs experimentally infected with *Ascaris lumbricoides*." **18** (66), 119–120.
c. DRUDGE, J. H., LELAND, Jr., S. E. & WYANT, Z. N., 1957.—" Strain variation in the response of sheep nematodes to the action of phenothiazine. I. Studies of mixed infections in experimental animals." **18** (66), 133–141.
d. BELL, R. R., 1957.—" A survey of the gastrointestinal parasites of cattle in North Carolina." **18** (67), 292–294.
e. BAKER, N. F. & DOUGLAS, J. R., 1957.—" The pathogenesis of trichostrongyloid parasites. II. Ferrokinetic studies in ruminants." **18** (67), 295–302.
f. DRUDGE, J. H., LELAND, Jr., S. E. & WYANT, Z. N., 1957.—"Strain variation in the response of sheep nematodes to the action of phenothiazine. II. Studies on pure infections of *Haemonchus contortus*." **18** (67), 317–325.
g. SHUMARD, R. F., BOLIN, D. W. & EVELETH, D. F., 1957.—" Physiological and nutritional changes in lambs infected with the nematodes, *Haemonchus contortus*, *Trichostrongylus colubriformis*, and *Nematodirus spathiger*." **18** (67), 330–337.
h. WILLIAMS, Jr., F. P. & HABERMANN, R. T., 1957.—" An evaluation of the efficacy of stylomycin phenothiazine, cadmium anthranilate, and the piperazine compounds for the removal of oxyurids in mice." **18** (67), 429–431.

(5a) Douvres gives four useful keys for the identification of the third-stage larvae of eight species and the fourth-stage larvae of nine species of nematodes parasitic in the abomasum and small intestine of cattle. With one exception, in which measurements are used, the keys are based on anatomical characters of the anterior and posterior ends. These are illustrated by 28 figures. R.T.L.

(5b) When one tenth of the therapeutic dose of polymeric piperazine-1-carbodithioic acid was given daily in the feed to pigs one week before and for three weeks after they were experimentally infected with *Ascaris lumbricoides*, the migrating larvae caused respiratory embarrassment and scarring of the liver, but no worms were recovered from the small intestine. The fate of the developing larvae was not ascertained. R.T.L.

(5c) Experimental data are submitted which suggest that the prolonged use of phenothiazine in a flock of sheep has resulted in drug-resistant strains of intestinal nematodes and more particularly of *Haemonchus contortus*. But the evidence collected is not yet sufficient to warrant the abandonment of phenothiazine-salt mixtures as a prophylactic. R.T.L.

(5d) From material collected from cattle at slaughterhouses in 19 localities in North Carolina in 1955–56 the numbers and species of the helminths found are tabulated. R.T.L.

(5e) Adapting the procedure of Huff *et al.* for determining iron turnover rates in man by the use of Fe^{59}, Baker & Douglas find that the plasma iron turnover rate in a Hereford steer suffering from chronic trichostrongylidiasis was 1·58 mg. per kg. per day, representing an increase of three to four times that found in controls. It is concluded, from the haematological and ferrokinetic data presented, that the anaemia in this steer is attributable to a fivefold shortening of the survival time of the red blood cells and the inhibition of the ability of the bone marrow to compensate for this. R.T.L.

(5f) When helminth-free lambs were infected with pure cultures of two distinct strains intermediate between *Haemonchus contortus* and *H. placei*, the differences in their response to daily low level doses of phenothiazine were striking and consistent. The egg and larval counts from three experiments are graphed. It is concluded that prolonged and intensive administration of phenothiazine resulted in the appearance of a strain of *H. contortus* with a significant level of resistance. An increase in the lack of effectiveness of phenothiazine under field conditions was apparent in the records of the diagnostic section of the Kentucky Agricultural Experiment Station during the summer of 1955. R.T.L.

(5g) To ascertain the effects of heavy mixed infections of gastro-intestinal nematodes on the physiology and nutrition of parasite-free lambs, four lambs each received a single dose of approximately 150,000 infective larvae, viz., 40,000 *Haemonchus contortus*, 100,000 *Trichostrongylus colubriformis* and 10,000 *Nematodirus spathiger*. The lambs were kept in pens without bedding and with concrete walls and floors. Tables and charts show, for the four infected lambs and four controls, the amount of food and water consumed per pound weight, the average changes in weight, the average daily food and water consumption, the percentage of water in the faeces, the blood haemoglobin levels, haematocrit values, blood glucose, inorganic serum phosphorus levels, serum albumin-globulin ratios, total serum protein and the digestibility of protein and of crude fibre. In the four infected lambs the food consumption decreased progressively and there were rapid losses in weight but there was little decrease in water consumption per pound of lamb before debility set in. Hyperglycaemia and hypophosphotaemia, lowering of the total serum protein and increased albumin-globulin ratios became apparent. Digestibility of protein gradually diminished and that of crude fibre fluctuated widely as the infection progressed. R.T.L.

(5h) Although Grumble *et al.* have reported that a single dose of piperazine hexahydrate was more effective than one of stylomycin in removing *Aspiculuris tetraptera* from mice, the authors find that 3 mg. per 10 gm. of molasses feed removed 98·1% whereas the percentage of oxyurids (*A. tetraptera* and *Syphacia obvelata*) removed by phenothiazine (50 mg. per 10 gm.) was 70·1%, by piperazine adipate (10 mg. per 10 gm.) 50·4%, by cadmium anthranilate (25–30 mg. per 10 gm.) 55·3%, by aminonucleoside of stylomycin (1·0–3·0 mg. per 10 gm.) 44·8%, by Parvex (10–20 mg. per 10 gm.) 44·04% and by Pipcide (5–10 mg. per 10 gm.) 11·7%. The controls lost 13·1% of their worms spontaneously. Stylomycin did not remove *Hymenolepis* spp. R.T.L.

6—Annales de Parasitologie Humaine et Comparée.

a. BAILENGER, J., 1957.—" Une zone française d'endémie hydatique: les Basses-Pyrénées." **32** (1/2), 21–27.
b. DOLLFUS, R. P., CHABAUD, A. G. & GOLVAN, Y. J., 1957.—"Helminthes de la région de Banyuls. V. Nouveau distome *Aphalloïdes coelomicola* n.gen., n.sp. de la cavité générale d'un *Gobius* d'eau saumâtre." **32** (1/2), 28–40.
c. DOLLFUS, R. P., 1957.—" Sur trois distomes (*Telorchis*, *Opisthioglyphe*, *Astiotrema*) de couleuvres du genre *Natrix* Laurenti 1768." **32** (1/2), 41–55.
d. GOLVAN, Y. J., CHABAUD, A. G. & GRÉTILLAT, S., 1957.—" *Carmyerius dollfusi* n.sp. (Trematoda, Gastrothylacidae), parasite des bovidés à Madagascar." **32** (1/2), 56–70.
e. DAS, E. N., 1957.—" Les stades larvaires de *Centrorhynchus falconis* E. N. Das 1950." **32** (1/2), 71–82.
f. GOLVAN, Y. J., 1957.—" Acanthocéphales d'oiseaux, sixième note. Deux espèces nouvelles parasites d'oiseaux d'Afrique occidentale française: *Gordiorhynchus* (*Gordiorhynchus*) *gendrei* n.sp. et *Pseudogordiorhynchus antonmeyeri* n.gen. et n.sp." **32** (1/2), 83–97.
g. CHABAUD, A. G., 1957.—" Revue critique des nématodes du genre *Quilonia* Lane 1914 et du genre *Murshidia* Lane 1914." **32** (1/2), 98–131.

(6b) The authors describe and figure *Aphalloïdes coelomicola* n.g., n.sp. from the body-cavity of two *Gobius* collected in a brackish-water canal. The new genus, which is proposed provisionally, is compared with *Siphoderina* (sensu Yamaguti), *Metadena* (sensu stricto) and *Aphallus* and, although aberrant, is placed in the emended subfamily Siphoderinae. There is no gonotyl and neither cirrus nor cirrus pouch is present; the receptaculum seminis is enormous and lies in front of the ovary; the cuticle is without spines; the uterus does not extend behind the testes. Although the cercaria is not yet known it is probably one found developing in rediae in *Hydrobia stagnalis* from the same biotope. S.W.

(6c) From an examination of some of Dujardin's unpublished drawings of *Distoma assula* Dujardin, 1845 and comparison with the descriptions of *Telorchis ercolanii* Monticelli, 1893, Dollfus concludes that they are the same; the name therefore becomes *T. assula*. He reaffirms that *Cercorchis* is a synonym of *Telorchis*. *Opisthioglyphe natricis* n.sp. from *Natrix* sp. (either *N. natrix* var. *persa* or *N. viperina*) is the second species of this genus to be described from snakes and is easily distinguished from the other, *O. magnus*, by its much smaller size, by the tandem position of the testes with one touching the other and by the cirrus pouch which is only partially in front of the anterior border of the ventral sucker. The genus *Opisthioglyphe* is discussed. *Astiotrema monticellii* from *N. natrix* and *N. viperina* is redescribed and illustrated and a list of the distome parasites of these two snakes is given. The occasional presence of *O. ranae* in *Natrix* spp., presumably as a result of ingesting parasitized frogs, is discussed in an addendum together with a brief description of an atypical specimen collected from *N. natrix* by the author. S.W.

(6d) *Carmyerius dollfusi* n.sp. and *C. spatiosus* occur in Bovidae in Madagascar and cause a high mortality especially in young animals. The new species is found on the mucosa of the oesophageal groove and is described and figured from whole specimens and sections. *C. dollfusi* belongs in the group containing *C. synethes* and *C. mancupatus* and closely resembles the latter but may be distinguished from it by the much larger oral sucker, the very short oesophagus, the distribution of the vitellaria which never lie dorsally and the presence of a latero-ventral swelling at the base of the pouch. The dimensions and main characteristics of *C. dollfusi*, *C. mancupatus* and *C. synethes* are given in a table. The Gastrothylacidae are briefly discussed. S.W.

(6e) Das collected juveniles and larvae of *Centrorhynchus falconis* from the mesenteries of *Ptyas mucosus* and describes and figures their development, illustrating the various stages by photomicrographs of whole mounts and sections. He recognizes seven stages in growth of the acanthella: the earliest (0·52 mm. long) has spines over almost all the body and contains two nucleated masses, the anterior giving rise to the proboscis, proboscis receptacle and retractor muscles and the posterior to the genital organs and posterior part of the body; by the sixth stage the proboscis has taken on its definitive form and at the seventh or last acanthella stage the proboscis region is 0·38 mm. long by 0·28 mm. wide and the body

0·55 mm. long by 0·45 mm. wide and the posterior nucleated mass is becoming fragmented. In the juveniles the nucleated masses have completely disappeared, the proboscis is retracted and the female genital organs are becoming visible. At this stage specific identification is possible. S.W.

(6f) *Gordiorhynchus* (*Gordiorhynchus*) *gendrei* n.sp. is described and illustrated from *Asturinula monogrammica*; the most striking morphological characteristic is the exceptionally long and thin body, 46 mm. in length in the male and 84 mm. in the female; sexually mature females have a large sub-spherical dilatation on the posterior end. *Pseudogordiorhynchus antonmeyeri* n.g., n.sp. from *Halcyon senegalensis* is closely related to *Gordiorhynchus* (*Gordiorhynchus*); in the new genus the proboscis receptacle is inserted at the base of the rostrum below the last circle of spines whereas in *Gordiorhynchus* it is inserted in the middle of the proboscis. In a footnote to this paper Golvan points out that both the generic and subgeneric names of *Centrorhynchus* (*Longirostris*) are preoccupied and should be replaced by *Gordiorhynchus* (*Gordiorhynchus*); the full account of this will appear in *Bull. Inst. franc. Afr. noire*, **19**, 412–416. S.W.

(6g) Chabaud has made a detailed and extensive critical review of the genera *Quilonia* and *Murshidia*, beginning with a re-examination and revision of the material studied by Neveu-Lemaire. *Buissonia* becomes a synonym of *Murshidia* as the species allocated to it are specimens of *Murshidia* spp. from which the cephalic cuticle has become detached. *Murshidia* is divided into two subgenera, *Pteridopharynx* which contains eleven of the more primitive species and *Murshidia* with nine species and one variety; a number of species are made synonymous. *Neomurshidia* is proposed as a new genus for the species parasitizing tapirs in the New World, with *N. monosticha* (Diesing, 1851) as type. *Quilonia* contains nine African and two Asiatic species: *Paraquilonia brumpti* and *Q. rhinocerotis* are synonyms of *Q. africana*. Keys to the various species of *Quilonia* and *Murshidia* are given. In the general discussion Chabaud points out that these genera, with a simple life-cycle and living in the caecum of the large herbivores are isolated from the influence of natural selection. Consequently there are many species in each genus and many teratological specimens; species with characters intermediate between those of the primitive and those of the more specialized species are present and it is possible to trace the evolutionary sequence within a genus; this is particularly evident in the transition from triradiate to biradiate symmetry. S.W.

7—Annals of Tropical Medicine and Parasitology.

a. BOGLIOLO, L., 1957.—" The anatomical picture of the liver in hepato-splenic schistosomiasis mansoni." **51** (1), 1–14.
b. WATSON, J. M. & AL-HAFIDH, R., 1957.—" A modification of the Baermann funnel technique, and its use in establishing the infection potential of human hookworm-carriers." **51** (1), 15–16.
c. KERSHAW, W. E., PLACKETT, R. L., MOORE, P. J. & WILLIAMS, P., 1957.—" Studies on the intake of microfilariae by their insect vectors, their survival, and their effect on the survival of their vectors. IX. The pattern of the frequency of the blood-meals taken in by *Chrysops silacea* and of the survival of the fly in natural conditions in the rain-forest of the British Cameroons and on a rubber estate in the Niger delta." **51** (1), 26–37.
d. CROSSKEY, R. W., 1957.—" Man-biting behaviour in *Simulium bovis* De Meillon in Northern Nigeria, and infection with developing filariae." **51** (1), 80–86.

(7a) Contrary to commonly accepted belief, Bogliolo is of opinion that no other form of liver disease produces the macroscopical and microscopical features found in hepato-splenic schistosomiasis. 18 out of 21 cases had Symmers' "clay-pipe-stem" cirrhosis, two had diffuse bilharzial fibrosis and one had "flint liver". These three types are described in detail. The results of injecting a number of livers with vinyl acetate or gelatine to reveal the portal venous tree are described and illustrated by photographs. The anatomical picture suggests that the hepatic cells are not directly involved and that the hepatic functions are less involved than in other liver diseases. In none of the cases studied was the portal circulation disturbed

by thrombosis. Such disturbances as occurred were probably due to retraction of the peri-portal connective tissue and the rigidity and enlargement of the portal veins, reduced contractility through inflammatory destruction of their smooth muscle and the sudden fall in the blood velocity following the formation of a vast capillary network. R.T.L.

(7b) The Baermann technique for the extraction of nematode larvae from the faeces or soil, as modified by Rugai, Mattos & Brisola [for abstract see Helm. Abs., **23**, No. 715a], has been further simplified and improved by fitting into the top of an ordinary conical urine glass a basket made of wire gauze with flanges bent over to hold it on firmly. The basket is lined with a double layer of cheese cloth. The sample to be examined is comminuted and then placed on the cheese cloth. Warm water, slightly over blood temperature, is then gently introduced down the side of the glass until it reaches slightly above the bottom of the sample. The nematode larvae sink in the water to form a concentrated sediment at the bottom of the glass which can be removed by a Pasteur pipette. R.T.L.

(7d) During dissections of 116 *Simulium bovis* from the Abuja Emirate in the Niger Province, where human onchocerciasis is wide-spread, seven flies were found to contain filarial larvae similar to those of *Onchocerca volvulus*; in three of these the larvae had reached the infective stage. From this it is suspected that *S. bovis* may be a vector of onchocerciasis although these flies only occasionally bite man. R.T.L.

8—Australian Veterinary Journal.

a. GORDON, H. McL., 1957.—" Studies on anthelmintics for sheep: dihydroxyanthraquinones and some other quinones." **33** (2), 39–42.

(8a) Gordon has carried out laboratory and field studies on the efficacy of 1 : 8 dihydroxyanthraquinone as an anthelmintic for sheep. Preliminary tests showed that the dosage recommended by the manufacturers (5 gm.) was a severe purge for sheep and caused pathological changes in the liver and kidney. At lower doses it was very effective against nematodes of the large bowel, including *Trichuris* spp., irrespective of whether it was given into the rumen or abomasum. Efficiency against *Haemonchus contortus* was greater than against *Ostertagia* spp. and especially *Trichostrongylus* spp. which were only slightly affected. In a field trial effective selective control of *Chabertia ovina* was achieved. Apart from its action on *Trichuris* spp., the smaller doses required and the lower cost it has no advantage over phenothiazine. Combination with phenothiazine did not enhance the efficacy of either. Of the other compounds tested only 1 : 2 dihydroxyanthraquinone (alizarin) showed any anthelmintic action and this was slight. S.W.

9—British Medical Journal.

a. SIMPSON, E. J. B., 1957.—" Bancroftian filariasis simulating lumbar disk lesions." [Correspondence.] Year 1957, **1** (5009), 49.
b. BICKERSTAFF, E. R., 1957.—" Allergic basis for migraine: a lesson from *Loa loa*." Year 1957, **1** (5014), 327.
c. MACFARLANE, L., 1957.—" Preservation of parasite ova." [Correspondence.] Year 1957, **1** (5014), 342.
d. WILDERVANCK, A., 1957.—" Tropical pulmonary eosinophilia." [Correspondence.] Year 1957, **1** (5027), 1119.

(9b) Clinical details are given of a case with Calabar swellings and urticarial rashes associated with intense and frequent attacks of migraine. The migraine and urticarial symptoms ceased dramatically after a first dose of 25 mg. of promethiazine which was continued thrice daily during a subsequent three weeks' course of hetrazan. Apart from one typical Calabar swelling during the treatment the patient remained well and was still free from headache, hemianopsia and swellings eighteen months later. R.T.L.

(9c) Helminth ova are kept in 10% formol saline for teaching purposes at the Royal Army Medical College. The structures remain clear and some are still used for demonstration after 30 years. R.T.L.

(9d) Hypereosinophilia is generally considered to be a first reaction to early filarial infection yet it is seldom seen in Paramaribo where filarial infections are common. The author recalls that in the three cases of relapsing asthmatic bronchitis with tropical eosinophilia previously reported by Wildervanck *et al.* (1953) from Paramaribo, filariae were absent from the blood and glands but all three patients were found, by animal experiments, to be carriers of *Histoplasma* but this might have been a coincidence only. R.T.L.

10—British Veterinary Journal.

a. GIBSON, T. E., 1957.—" Critical tests of piperazine adipate as an equine anthelmintic." **113** (2), 90–92.

(10a) In critical tests with piperazine adipate, a dosage of 10 gm. per 100 lb. body-weight reduced by 95% the *Trichonema* spp. and by 76% and 55% the *Triodontophorus* spp. but was of little value against *Oxyuris equi*, as determined by worm counts made during treatment and at autopsy on two foals previously infected experimentally with 30,000 larvae. It was noted that very few worms were expelled during the period between the 72nd and 96th hour after dosing and that there would have been no appreciable difference in the results if the faeces had only been examined during the 48 hours after treatment. R.T.L.

11—California Agriculture.

a. LEAR, B. & THOMASON, I. J., 1957.—" Soil fumigation for nematodes." **11** (2), 6, 15–16.

(11a) Lear & Thomason describe field experiments carried out during 1953, 1954 and 1955 on the efficacy of soil fumigants in the control of root-knot nematodes in tomatoes. Five experimental fields were established in the main tomato-growing areas of California on sandy loam, clay loam and sandy soils. Data on the moisture content and temperature range for each plot are given. Yield and the degree of root galling were the criteria of control. On sandy loam soils Nemagon gave the best results against *Meloidogyne incognita* var. *acrita* and ethylene dibromide against *M. javanica*. On clay loam with *M. incognita* var. *acrita*, Nemagon caused a decrease in yield although root scores showed that Nemagon and ethylene dibromide were the most effective; D-D mixture at 20 gallons per acre, solid application, gave the highest yield; Vapam was not effective. On a sandy soil D-D, Nemagon and ethylene dibromide appeared to be about equally effective; Vapam was ineffective except when applied by sprinkler and the authors conclude that this would be more useful for the treatment of seed-beds than for field application. S.W.

12—Canadian Journal of Comparative Medicine and Veterinary Science.

a. SWEATMAN, G. K., 1957.—" Acquired immunity in lambs infected with *Taenia hydatigena* Pallas, 1766." **21** (3), 65–71. [French summary p. 70.]

(12a) Sweatman has demonstrated experimentally that absolute immunity to *Taenia hydatigena* may be produced in lambs. Ten lambs were given initial doses of ova, the numbers varying between 50 and 800 per animal, and seven weeks later were each given a challenging dose of 5,000 ova. Control lambs each received one dose of 5,000 ova. At autopsy 15–19 days later the controls showed lesions typical of a two to three-week-old infection whereas the immunized lambs showed no evidence of the second infection, the hepatic streaks being replete with caseous and fibrotic material, the mesenteric and omental cysticerci containing fully developed rostellar hooks and there being no cysticerci in the abdominal fluid, all these resulting from the initial dose. Observations on two naturally infected lambs corroborated these findings. S.W.

13—Canadian Journal of Zoology.

a. ANDERSON, R. C., 1957.—" Observations on the life cycles of *Diplotriaenoides translucidus* Anderson and members of the genus *Diplotriaena*." **35** (1), 15–24.
b. ANDERSON, R. C., 1957.—" Taxonomic studies on the genera *Aproctella* Cram, 1931 and *Carinema* Pereira and Vaz, 1933 with a proposal for a new genus *Pseudaproctella* n. gen." **35** (1), 25–33.
c. SANWAL, K. C., 1957.—" The morphology of the nematode *Radopholus gracilis* (de Man, 1880) Hirschmann, 1955, parasitic in roots of wild rice, *Zizania aquatica* L." **35** (1), 75–92.
d. SWEATMAN, G. K. & PLUMMER, P. J. G., 1957.—" The biology and pathology of the tapeworm *Taenia hydatigena* in domestic and wild hosts." **35** (1), 93–109.
e. BELLE, E. A., 1957.—" Helminth parasites of reptiles, birds, and mammals in Egypt. IV. Four new species of oxyurid parasites from reptiles." **35** (2), 163–169.
f. STRACHAN, A. A., 1957.—" Eye worms of the family Thelaziidae from Brazilian birds." **35** (2), 179–187.
g. GIBBS, H. C., 1957.—" Helminth parasites of reptiles, birds, and mammals in Egypt. III. *Cyathospirura seurati* sp. nov. from *Fennecus zerda*." **35** (2), 201–205.
h. WU, L. Y. & KINGSCOTE, A. A., 1957.—" Studies on *Trichinella spiralis*. II. Times of final molt, spermatozoa formation, ovulation, and insemination." **35** (2), 207–211.
i. MAWSON, P. M., 1957.—" Filariid nematodes from Canadian birds." **35** (2), 213–219.
j. MAHON, J., 1957.—" *Ophryocotyle brasiliensis* sp.nov. (Davaineidae) from *Hoploxypterus cayanus* (Lath.)." **35** (2), 279–282.
k. MYERS, B. J., 1957.—" Nematode parasites of seals in the Eastern Canadian Arctic." **35** (2), 291.
l. MYERS, B. J., 1957.—" Ascaroid parasites of harp seals (*Phoca gröenlandica* Erxleben) from the Magdalen Islands, Quebec." **35** (2), 291–292.

(13a) Anderson collected *Diplotriaenoides translucidus* from the air sacs of *Seiurus aurocapillus* and *Diplotriaena* spp. from those of *Quiscalus quiscula*, *Vermivora ruficapilla* and *Agelaius phoeniceus*. Eggs were found in the lungs and alimentary canal indicating that the eggs of the Diplotriaeninae normally leave their host in the faeces. Eggs were fed to a number of invertebrates; spirurid larvae were subsequently found only in grasshoppers (*Camnula pellucida*) and appeared to be those of *Diplotriaenoides translucidus*. The first-stage, moulting second-stage and third-stage larvae were recovered and are described and figured. Anderson points out that although it is not impossible that the grasshoppers were infected when collected it is very improbable. He considers it unlikely, because of the feeding habits of *S. aurocapillus*, that grasshoppers are the natural intermediaries for *D. translucidus*. An attempt to infect one *Zonotrichia albicollis* with the third-stage larvae was unsuccessful. S.W.

(13b) Anderson redescribes *Aproctella stoddardi*, drawing attention to the distinct lateral protruberances of the buccal capsule, from specimens collected from *Zonotrichia albicollis*, *Geothlypis trichas*, *Hylocichla ustulata* and *Bonasa umbellus*; he emends *Aproctella* and considers *Carinema* Pereira & Vaz, 1933 to be a synonym, *C. carinii* becoming *A. carinii* n. comb. *A. nuda* Ybarra, 1948 *nec* Hamann, 1940 is shown to belong to *A. stoddardi* and *Microfilaria fallisi* is probably also a synonym. *Pseudaproctella* n.g. is proposed for *A. nuda* Hamann, 1940 *nec* Ybarra, 1948 and *Carinema dubia* Johnston & Mawson, 1940 is transferred to the new genus. *C. graucalinum* Johnston & Mawson, 1940 is transferred to *Paraprocta* as *P. graucalinum* n. comb. S.W.

(13c) The anatomy of *Radopholus gracilis* is described in detail. Intravital staining with methylene blue and neutral red were used in this study, together with Cajal's silver impregnation method and Golgi's bichromate silver method. Sanwal observed that the nematodes were adapted to an aquatic environment and were unaffected by the low temperatures and low oxygen tension of their habitat. J.B.G.

(13d) From a detailed study of the cysticerci of *Taenia hydatigena* in 29 lambs and five pigs experimentally infected and from observations on naturally infected sheep, cattle, pigs, moose and deer, Sweatman & Plummer conclude that the pathological changes caused by the parasite are of localized importance but have little significant effect on the general health of the host. The gross and histopathology of the observed lesions are described. The development of the cysticerci is followed from the first appearance of white fibrotic foci immediately below the liver capsule seven days after exposure, through their migration from

the liver and omentum (18–25 and 25–30 days after infection respectively) and their time in the abdominal fluid (up to the 43rd day after infection). Cysticerci which remained in the liver parenchyma did not complete the development of the rostellar hooks but those at other sites developed suckers and complete rostellar hooks between 34 and 53 days and only these were infective to dogs. The growth rates and viability of the cysticerci are described and the effect of temperature upon them discussed. S.W.

(13e) *Thelandros cameroni* n.sp., from the large intestine of *Chalcides sepoides* and *Scincus* sp., most closely resembles *T. maplestoni* but possesses caudal alae and has the ovarian tubes behind the oesophageal bulb; it can be distinguished from *T. taylori*, the only other species with caudal alae, by the spicule which is twice as long in *T. cameroni*. *T. kuntzi* n.sp., from the large intestine of *Agama* sp., may be distinguished from all other species, except *T. taylori*, by the vagina which runs anteriorly before dividing into divergent uteri and from *T. taylori* by the absence of caudal alae in the male and the larger ova. *Spinicauda grimmae* n.sp. occurred in the large intestine of *Scincus officinalis*; the most closely related species is *Spinicauda japonica* but the two differ in the length of the spicule, the size of the ova and the number and distribution of the anal papillae. The genus *Aplectana* is emended to include *A. pharyngeodentata* n.sp. from *Chalcides delislii*, *C. sepoides* and *Scincus officinalis*; the pharynx in the new species is armed with three large teeth and the ova are irregular in shape. S.W.

(13f) Strachan reports on 18 species of three genera of the Thelaziidae from the eyes of birds in Brazil. Of these four are described and illustrated as new to science. *Thelazia sicki* n.sp. from *Otus* sp. resembles *T. lutzi* but differs in size, the arrangement of the papillae in the males, the ratio of the size of the spicules and the presence of a single terminal papilla on the tail of the female. *T. spizaëti* n.sp. from *Spizaëtus ornatus* may be distinguished from *T. pittae*, which it most closely resembles, by the number and arrangement of the pre-anal papillae, the number of cephalic papillae and the similar subequal spicules. *T. anadorhynchi* n.sp. from *Anadorhynchus hyacinthinus* does not resemble any known species of the genus; it is characterized by the absence of the filiform portion of the spicules, the presence of three pairs of post-anal and eight pairs of pre-anal papillae, the absence of cephalic papillae, the presence of caudal alae in the female and the structure of the vagina and vulva. *Oxyspirura cameroni* n.sp. occurred in *Tityra cayana*; it is similar to Caballero's *O. octopapillata* but has 12 papillae on the head of both sexes and there are three pairs of pre-anal and four pairs of post-anal papillae in the male. There is a parasite-host list. S.W.

(13g) Gibbs describes and illustrates *Cyathospirura seurati* n.sp. from the stomach of *Fennecus zerda*. The new species appears to be closely related to *C. chevreuxi* and *C. nouveli* but may be distinguished from the former by the possession of characteristic ribbed supporting structures in the buccal capsule and from the latter by being much shorter and having the vulva behind the middle of the body and the tail of the female spineless. He considers that as the specimens from the leopard, which were identified by Seurat as *C. chevreuxi*, show considerable differences from the original material from *Felis ocreata* they should be regarded as species inquirendae pending further investigation. S.W.

(13h) Wu & Kingscote infected albino mice with *Trichinella spiralis* and killed them at two-hourly intervals. The final moulting began 27 hours after infection and was always completed by the 33rd hour. Many of the moulting specimens were observed to have a slender tube at the tip of the cuticle, this probably being the cloacal lining in the male and the rectal lining in the female. The copulatory tube may be a modified structure of the cuticular lining of the cloaca. Spermatogonia first appeared in the testes in small numbers at 24 hours and spermatozoa at 26 hours. Ova were first observed in the seminal receptacles at 37 hours and at this time some also contained spermatozoa. Insemination and ovulation were thus six or seven hours later than expected. Similar experiments in albino rats first showed ova in the seminal receptacles 30 hours, and ova and spermatozoa 32 hours, after infection. In both mice and rats there was considerable individual variation but ovulation is independent of insemination. S.W.

(13i) Among nine filariids recorded by Mawson from Canadian birds four are described and figured as new to science. *Desmidocerca nudicauda* n.sp. from *Ardea herodias* differs from other members of the genus chiefly in the absence of caudal spines. *Carinema ardae* n.sp., from *A. herodias* and *Botaurus lentiginosus*, resembles *C. graucalinum* in measurements and body form but differs from it in lacking cephalic papillae. *Diplotriaena sialiae* n.sp. from *Sialia currucoides* is characterized by very long and heavy tridents reaching almost to the nerve ring. *Avioserpens nana* n.sp. from *Ardea herodias* is distinguished from all other species of the genus by the very small size of the female and from *Avioserpens galliardi*, the only other species in which the male is known, by the length of the spicules. S.W.

(13j) Mahon describes and figures *Ophryocotyle brasiliensis* n.sp. from *Hoploxypterus cayanus*. This is the first record of *Ophryocotyle* in South America. Although the anterior end is lacking, so that the scolex and number of testes are unknown, the material is clearly distinct because of the very large size of the cirrus pouch and eggs and the much greater number of muscle bundles than in other described species. The measurements and main characteristics of *O. proteus*, *O. insignis*, *O. herodiae*, *O. zeylanici* and *O. brasiliensis* are given in a table. S.W.

(13k) Myers records *Contracaecum osculatum* and *Porrocaecum decipiens* as parasites of *Erignathus barbatus*, *Phoca hispida* and *P. vitulina*, *C. osculatum* as a parasite of *P. grœnlandica* and *Phocascaris* sp. of *Phoca hispida*. The localities in which the seals were collected are given. S.W.

(13l) The stomachs of 155 out of 195 adult *Phoca grœnlandica* contained nematodes. *Contracaecum osculatum* occurred in 124, *Porrocaecum decipiens* in 24 and *Phocascaris* sp. in seven. In only two instances were two species present. S.W.

14—Deutsche Tierärztliche Wochenschrift.

a. ENIGK, K., 1957.—" Verluste bei den Haustieren durch Parasitenbefall und ihre Verhütung." **64** (3), 54–58.
b. BARKE, A. & GIERSCHIK, H., 1957.—" Piperazin als Wurmmittel für Tiere." **64** (8), 177–180.

(14a) Enigk quotes and discusses statistics on the reduced yields from domestic animals infected with worms. Gastro-intestinal parasites of cattle have obviously increased in Germany as a result of strip-grazing. In northern Germany lungworms are especially important and in the recent years of heavy precipitation have become serious in parts of southern Hanover and Nordrhein-Westfalen. In Lower Saxony, liver-fluke has increased by over 50% since 1951. In 1954, 233,152 cattle livers were seized in West Germany. Enigk reviews the use of his inhalation apparatus for lungworm diseases [see Helm. Abs., **22**, No. 116a, **24**, No. 223b and No. 52b below] and suggests methods of dealing co-ordinately with the contol of liver-fluke vectors by sodium pentachlorophenate. He considers piperazine compounds and cadmium compounds the most suitable drugs for mass treatments. No treatments are yet known for 90 of the 145 important helminths of domestic animals in West Germany. M.MCK.

(14b) The effects of excessive doses of piperazine salts were observed in various animals. Mice withstood 2 gm., but succumbed to 4 gm., of piperazine citrate per kg. body-weight given in a 10% solution intraperitoneally. Three cats received respectively, as a single dose, 440 mg. and 530 mg. of the citrate and 675 mg. per kg. of the adipate and the second cat vomited. Single doses of 1·2 gm. and 1·5 gm. per kg., of the adipate, caused dogs to salivate and vomit and produced stupefaction and unsteadiness in one case. The erythrocyte count was slightly decreased in one dog by 1,040 mg. per kg. of piperazine adipate given daily for three days and the eosinophils disappeared during treatment but an eosinophilia which lasted for three days appeared after the treatment. The blood pressure of a dog dropped immediately following the intravenous injection of 5 or 10 mg. per kg. of adipate or 5 mg. per kg. of citrate, but regained the normal 70–90 seconds later. No side effects occurred in seven cockerels after single doses of 423 mg. to 1,013 mg. per kg., of adipate, or even after 3,688 mg. and 3,946 mg. per kg. given over three days. M.MCK.

15—Empire Journal of Experimental Agriculture.

a. PEACOCK, F. C., 1957.—" The effect of crop rotation on root-knot nematodes in the Gold Coast." **25** (98), 95–98.
b. PEACOCK, F. C., 1957.—" The effect of chemical treatments on root-knot nematodes in the Gold Coast." **25** (98), 99–107.

(15a) In field experiments in Ghana the greatest reduction in root-knot infection was observed in tomatoes planted, as indicators, subsequent to a cultivated bare-fallow during a dry season. Trap-crops and non-host crops also led to significant reductions in root-knot severity. R.T.L.

(15b) In Ghana, field experiments on the chemical control of *Meloidogyne* spp. by the fertilizers calcium cyanamide, ammonium sulphate and urea proved ineffective although pot experiments had given promising results. But soil injections with the fumigants D-D mixture, ethylene dibromide and crude tetrachlorobutadiene gave high degrees of control in the field as shown by the subsequent planting of tomatoes. R.T.L.

16—Experimental Parasitology. New York.

a. READ, C. P. & ROTHMAN, A. H., 1957.—" The role of carbohydrates in the biology of cestodes. I. The effect of dietary carbohydrate quality on the size of *Hymenolepis diminuta*." **6** (1), 1–7.
b. EVANS, A. S. & STIREWALT, M. A., 1957.—" Serologic reactions in *Schistosoma mansoni* infections. III. Ionographic fractionation of sera of mice with progressive disease." **6** (1), 8–17.
c. SOMMERVILLE, R. I., 1957.—" The exsheathing mechanism of nematode infective larvae." **6** (1), 18–30.
d. AGOSIN, M., VON BRAND, T., RIVERA, G. F. & McMAHON, P., 1957.—" Studies on the metabolism of *Echinococcus granulosus*. I. General chemical composition and respiratory reactions." **6** (1), 37–51.
e. DISSANAIKE, A. S., DISSANAIKE, G. A. & NILES, W. J., 1957.—" Production of radioactive infective larvae of *Wuchereria bancrofti* in *Culex fatigans*." **6** (1), 52–59.
f. DAUGHERTY, J. W., 1957.—" Intermediary protein metabolism in helminths. IV. The active absorption of methionine by the cestode, *H. diminuta*." **6** (1), 60–67.
g. ROWAN, W. B., 1957.—" The mode of hatching of the egg of *Fasciola hepatica*. II. Colloidal nature of the viscous cushion." **6** (2), 131–142.
h. LUND, E. E. & BURTNER, Jr., R. H., 1957.—" Infectivity of *Heterakis gallinae* eggs with *Histomonas meleagridis*." **6** (2), 189–193.
i. RADKE, M. G., SCHNEIDER, M. D. & HOUGHTALING, D. G., 1957.—" Dry weight, nitrogen and phosphorus content of *Schistosoma mansoni*." **6** (2), 202–207.
j. REINHARD, E. G., 1957.—" Landmarks of parasitology. I. The discovery of the life cycle of the liver fluke." **6** (2), 208–232.

(16a) Read & Rothman measured *Hymenolepis diminuta* from rats which had been fed diets containing single carbohydrate components. Worms from hosts receiving starch as the sole carbohydrate were larger than those from hosts which received glucose or sucrose. When enzymatically-degraded starch was used in the diet the worms were much smaller than when glucose or sucrose was used. W.P.R.

(16b) Evans & Stirewalt examined the sera of mice infected with *Schistosoma mansoni* by paper electrophoresis. Until the worms migrated to the mesenteric vessels there was no notable change in the serum proteins. After this the gamma-beta globulin fraction increased. The absolute concentration of the albumin fraction was unchanged. W.P.R.

(16c) Sommerville found that the second ecdysis of nematode larvae of parasites of sheep took place in the presence of a dialysable factor or factors from the contents of the alimentary canal of the host. Infective larvae of *Haemonchus contortus*, *Trichostrongylus axei* and *Ostertagia circumcincta* exsheathed in fluids from the rumen; these larvae, and those of *T. colubriformis*, *Nematodirus abnormalis* and *N. spathiger*, exsheathed in fluids from the abomasum. Larvae of *Oesophagostomum columbianum*, *T. colubriformis*, *N. abnormalis* and *H. contortus* exsheathed in fluids from the small intestine. The process of exsheathment in *T. axei* was studied in detail. Rumen fluid stimulated larvae to release an "exsheathing fluid"

from a region near the excretory cell. The exsheathing fluid acted directly on a circumscribed region of the cuticle, which then broke and enabled the larvae to escape. W.P.R.

(16d) Agosin *et al.* examined the composition and respiratory metabolism of cysts of *Echinococcus granulosus* from the livers of sheep. Fresh scolices contained 9·2% protein, 2% ether extract, 2% inorganic material and 2·8% polysaccharide (glycogen and a polysaccharide containing galactose and glucosamine). In Ringer's solution with air as the gas phase, scolices gave a Qo_2 of 2 at 38°C. The RQ was 0·88. The ionic composition of the medium affected the respiratory rate; hydatid cyst fluid and Ringer's solution sustained respiration best. The *p*H between 4·5 and 8·5 did not affect respiration. Between 28°C.–38°C. the oxygen uptake gave a Q_{10} of 2·1. Aerobic respiration was inhibited by cyanide and fluoroacetate but not by malonate. Anaerobic carbon dioxide production was pronounced. Both anaerobic and aerobic gaseous exchange was highly sensitive to inhibitors of glycolysis, but *dl*-glyceraldehyde was completely ineffective. W.P.R.

(16e) Dissanaike *et al.* allowed *Culex fatigans*, which had been tagged with P^{32}, to feed on patients infected with *Wuchereria bancrofti*. The distribution of the isotope in the mosquitoes was examined and the amount of isotope in the larvae of the nematode estimated. The activity of larvae from mosquitoes which had been reared in baths containing 0·1 μc. per ml. was about 20 counts per minute per larva. Similar experiments with ^{89}Sr were unsuccessful. W.P.R.

(16f) Daugherty found that ^{35}S-labelled methionine was able to move in both directions through the cuticle of *Hymenolepis diminuta*. Absorption was most active in the region of the scolex. The radioactivity of free amino-acids from the worm was confined to methionine. Only a small amount of the total radioactive amino-acid in the worm was found in the protein fraction, even after 30 minutes. When the temperature at which *H. diminuta* was incubated was dropped from 38°C. to 4°C. all regional differences in methionine absorption disappeared and the over-all rate of uptake was greatly depressed. The rate of uptake of ^{22}Na by the worm, or the rate of uptake of ^{35}S-labelled methionine by isolated rat diaphragm, was not so greatly affected by temperature. From this and other evidence the author concluded that active absorption of methionine took place in *H. diminuta*. W.P.R.

(16g) Rowan has shown that there is a decrease in the vapour pressure of the water surrounding eggs of *Fasciola hepatica* just before hatching. This follows the expansion of the viscous cushion which lies at the opercular end of the egg; this expansion is presumed to result from damage to the vitelline membrane by the hatching enzyme, permitting osmosis of salts and other materials into the surrounding medium, and plays no active part in hatching. The viscous cushion resembles a colloid and, although its chemical nature could not be conclusively determined, is probably protein, in part at least. There was no evidence that in *F. hepatica* it forms a flexible envelope protecting the miracidium from its environment for a short time after hatching, as described in *Spirorchis* sp. by Onorato & Stunkard in 1931. Exposure of the eggs to heat or poisonous solutions induced expansion of the cushion. S.W.

(16h) Lund & Burtner have demonstrated experimentally that the proportion of embryonated ova of *Heterakis gallinae* which contains *Histomonas meleagridis* is less than one in two hundred, even when the worms are obtained from birds known to be infected with the protozoon. Administration of single worms to six-weeks-old chickens produced *Histomonas* infections in 38·4% of the birds and administration of two worms produced infections in 62·5%. This figure was in very close agreement with the theoretical figure of 62·1%. Sixty birds were each given about 160 embryonated ova from a suspension prepared from about 100 worms and of these 39 became infected with *Histomonas*. When ova from the worms which developed in the experimental birds were fed to turkey poults the blackhead infection rate was approximately the same. As these tests were made with a non-pathogenic strain of *H. meleagridis* the conditions are not necessarily comparable in all respects with those found with pathogenic strains. S.W.

(16i) Radke *et al.* have determined the dry body-weight of *Schistosoma mansoni* from mice from the 34th to the 62nd day after infection. The wet weight could not be determined satisfactorily as it was difficult to remove completely the water adhering to the worms after washing. The dry body-weight per average worm increased nearly sixfold, i.e. from 12·4 μgm. to 68·4 μgm. The males nearly doubled their weight between the 48th and 62nd days, reaching a maximum of 92·3 μgm. The females did not follow this pattern and there was a decline in dry weight from the 48th day. The percentage nitrogen per worm averaged 8·7; in males and females from bisexual infections the average percentages were 8·5 and 10·4 respectively. The phosphorus content of male worms from a unisexual infection averaged 0·7%. S.W.

(16j) Reinhard recapitulates the history of the discovery of the life-cycle of the liver-fluke, tracing the various stages from the first known reference to it in a treatise on wool production and sheep management by Jean de Brie in 1379, through the observations of Sir Anthony Fitzherbert (1523), Gabucinus (1547), Conrad Gesner (1551), Francesco Redi (1668), John Faber (1670), Govard Bidloo (1698), Antony van Leeuwenhoek (1679, 1700 and 1704), Jacob Schäffer (1753) and Frank Nicholls (1755) to the recognition by Rudolphi in 1808 of the group Trematoda. Even until well into the 19th century the fluke was regarded as an effect rather than the cause of liver rot. The experiment performed by Peter Abildgaard in 1790 on the life-cycle of a cestode was the first indication that two hosts might be necessary for the life-cycles of flatworms and the subsequent observations of Küchenmeister (1852), Nitzsch (1807), Bojanus (1818) and Mehlis (1831) paved the way for the general acceptance of this hypothesis. Creplin in 1837 observed that the larva hatching from the egg of *Fasciola hepatica* is ciliated and Steenstrup conceived the idea of the fundamental alternation of generations in trematodes etc. Weinland in 1875 postulated that cercariae leaving *Limnaea truncatula* were those of the liver-fluke but it was not until the work of Leuckart in Germany and Thomas in England between 1880 and 1883 that the life-cycle was really understood. The concluding chapter was written by Sinitsin in 1914 when he demonstrated that the young flukes penetrate the gut wall and enter the liver from the capsule. S.W.

17—Folia Biologica. Prague.

a. PROKOPIČ, J., 1957.—[The influence of oecological factors on the specificity of parasitic worms of Insectivora.] **3** (2), 114–119. [In Russian: English summary pp.118–119.]

(17a) From a study of the helminth species parasitic in Insectivora in Czechoslovakia, Prokopič considers that specificity is determined oecologically, is influenced by natural selection and strengthened by heredity. Every species requires certain optimal conditions of life although it is able to exist under less favourable conditions which vary with different parasites. Some parasites are monophagous, others are polyphagous species. Specificity may be narrow, i.e. adapted exclusively to one host species, or relative, i.e. capable of existing in more than one host species either of a single genus or of different genera in a single family, or still less specific being limited to a single order. There are also species which are non-specific and infect widely different systematic host groups. As phylogenetic development of hosts and parasites have to some extent become stabilized by heredity, specificity may in some cases be a good guide to the phylogenetic relationships of the hosts. This however, is not as important as oecological factors, especially the composition of the food. Parasite specificity decreases with changes in the living conditions of the parasite or in the host or in both. R.T.L.

18—Indian Veterinary Journal.

a. MISHRA, M., 1957.—" Study of anthelmintic property of *Paederia foetida* in goat." **34** (1), 59–61.

(18a) Juice from fresh leaves of the wild creeper *Paederia foetida*, crushed in a mortar with a minimum of water, was administered to a goat the faeces of which had, the day before, contained 500 ova per gramme of *Haemonchus* sp. and 400 ova per gramme of *Strongyloides* sp. One ounce was given on the first day, half an ounce on the second day and one ounce on the

fourth day. No ova of *Strongyloides* were present after the second day and none of *Haemonchus* sp. after the fourth day. The faeces also contained 1,500 oocysts of coccidia on the day before treatment but none were present on the first or succeeding days after treatment. *Paederia foetida* is found in villages almost all over India. R.T.L.

19—Irish Journal of Medical Science.

a. DRURY, M. I., 1957.—" Trichiniasis." 6th Series, No. 374, pp. 84–85. [Discussion pp. 85–86.]

(19a) Drury reports a case of trichinelliasis seen at the Curragh Military Hospital. Six weeks previously the patient had eaten sausages purchased in Nenagh. In the subsequent discussion Dr. Furnell mentions that five other cases occurred recently in the Tipperary North Riding. R.T.L.

20—Journal of Agricultural Science.

a. SPEDDING, C. R. W. & BROWN, T. H., 1957.—" A study of subclinical worm infestation in sheep. I. The effect of level of infestation on the growth of the lamb." **48** (3), 286–293.

(20a) Details are given of an experiment which confirmed Spedding's earlier conclusions that in sheep with sub-clinical levels of helminth infection the increase in weight is less than normal. The loss in this experiment was associated with egg counts of 30 to 57 per gm. When lambs are folded across worm-free pasture infection, except with *Strongyloides papillosus*, can be prevented, save in a few individuals. R.T.L.

21—Journal of the American Veterinary Medical Association.

a. TURK, R. D., 1957.—" Anthelmintics in the control of parasitisms of farm animals." **130** (1), 7–9.
b. GRICE, H. C., HUTCHISON, J. A. & SAY, R. R., 1957.—" Obstructive jaundice ascribed to *Metorchis conjunctus* in a cat with a bifid gallbladder." **130** (3), 130–132.
c. UNDERDAHL, N. R. & KELLEY, G. W., 1957.—" The enhancement of virus pneumonia of pigs by the migration of *Ascaris suum* larvae." **130** (4), 173–176.
d. KEMPER, H. E., 1957.—" Filarial dermatosis of sheep." **130** (5), 220–224.
e. SWANSON, L. E., STONE, W. M. & WADE, A. E., 1957.—" Efficacy of piperazine citrate in removing worms from the alimentary canal of cattle." **130** (6), 252–254.

(21a) Turk emphasizes that in the control of parasitism in farm animals changes in management and nutrition are often more effective than anthelmintic treatment. Those showing clinical signs of infection are sick animals and are more liable than healthy animals to show ill effects from the toxicity of anthelmintics. Early treatment is therefore advisable and an adequate level of nutrition maintained. The recent results following the use of piperazine are summarized from the literature. R.T.L.

(21c) Underdahl & Kelley found that the presence of migrating larvae of *Ascaris lumbricoides* in the lungs of pigs inoculated with virus pneumonia of pigs caused a marked increase in the extent of the consolidation of the lungs. They recommend that measures should be taken to control ascariasis, thus reducing the effect of virus pneumonia of pigs. W.P.R.

(21d) The microfilariae of *Elaeophora schneideri* in the skin of sheep, in some mountain localities of New Mexico, Colorado and Arizona cause intense itching. The resulting scratching produces raw, bleeding inflammatory patches containing small abscesses especially on the head but also on the face and abdomen. The lesions eventually dry with greyish flaky scales and resemble ringworm infections. Intravenous injections of trichicide, fouadin or anthiomaline destroyed the microfilariae in the skin and the adults in the arteries and the lesions healed within three weeks. A high protein diet should be given before and during treatment which although effective is only palliative as the life-cycle is unknown. R.T.L.

(21e) Piperazine citrate is a promising anthelmintic against certain gastro-intestinal nematodes of cattle. When given to calves a solution equivalent to 7·1 gm. per 100 lb. body-weight of anhydrous piperazine eliminated *Oesophagostomum radiatum* (100%), *Cooperia* spp. (76·4%), *Ostertagia ostertagi* (81·3%), *Trichostrongylus axei* (16·4%), *Bunostomum phlebotomum* (12·1%) and *Haemonchus contortus* (8%), while a single dose of piperazine citrate solution equivalent to 14·2 gm. per 100 lb. of anhydrous piperazine was non-toxic and eliminated *Oesophagostomum radiatum* (100%), *Cooperia* spp. (97·6%), *Ostertagia ostertagi* (71·9%), *T. axei* (2·1%), *B. phlebotomum* (33·9%), *H. contortus* (15·1%), *Nematodirus* spp. (55·5%) and *Trichuris discolor* (11·6%). Although piperazine is unlikely to replace phenothiazine as an anthelmintic for cattle it should effectively supplement it. R.T.L.

22—Journal of Helminthology.

a. ROSE, J. H., 1957.—" Observations on the larval stages of *Muellerius capillaris* within the intermediate hosts *Agriolimax agrestis* and *A. reticulatus*." **31** (1/2), 1–16.
b. ROSE, J. H., 1957.—" Observations on the bionomics of the free-living first stage larvae of the sheep lungworm, *Muellerius capillaris*." **31** (1/2), 17–28.
c. YEH, L. S., 1957—" On *Physaloptera lumsdeni* n.sp. from a bush-baby in Tanganyika, with a note on *Abbreviata caucasica*." **31** (1/2), 29–32.
d. YEH, L. S., 1957.—" On *Chandlerella braziliensis* n.sp. from a green-billed toucan and a discussion on some related genera." **31** (1/2), 33–38.
e. SOUTHEY, J. F., 1957.—" Observations on races of *Ditylenchus dipsaci* infesting bulbs." **31** (1/2), 39–46.
f. DISSANAIKE, A. S., 1957.—" On protozoa hyper-parasitic in helminths, with some observations on *Nosema helminthorum* Moniez, 1887." **31** (1/2), 47–64.
g. SANDARS, D. F., 1957.—" Cestoda from *Rattus assimilis* (Gould, 1858) from Australia." **31** (1/2), 65–78.
h. SANDARS, D. F., 1957.—" *Hymenolepis miniopteri* n.sp., (Cestoda), from an Australian bat, *Miniopterus blepotis* (Temminck, 1840)." **31** (1/2), 79–84.
i. BISSERU, B., 1957.—" On two new trematodes (Proterodiplostomatidae) from an African crocodile, and a list of strigeid parasites from Africa." **31** (1/2), 85–102.

(22a) The larvae of *Muellerius capillaris* were frequently found in *Agriolimax agrestis* and *A. reticulatus* in the south of England and occur throughout the greater part of the year. These slugs were easily infected in the laboratory and reached the infective stage in eight days at 25°C. They can survive within the foot of the slug for long periods. After the death of the slugs the pre-infective stage can survive for seven days and the infective stage for 16 days. Unlike the infective stage the pre-infective stage cannot survive artificial digestion. Three larval stages are figured. R.T.L.

(22b) Under natural conditions the first-stage larvae of *Muellerius capillaris* survived for several months in dried faecal pellets, and did not migrate on the herbage. They can resist desiccation for several days but are rapidly killed by bright sunlight. Under laboratory conditions they survived desiccation for 9 to 16 days, depending on the relative humidity, and were alive after three days of continuous freezing. R.T.L.

(22c) *Physaloptera lumsdeni* n.sp. was found in *Galago crassicaudatus agisymbanus* at Zanzibar. It resembles *P. dispar* but its trifid tooth is smaller and the longitudinal markings on the male tail are not so fine while the pedunculated papillae are less distinct and shorter. The left spicule is only half that of the right in average length. *Abbreviata caucasica* occurred in five out of seven *Cercopithecus aethiops nesiotes*. R.T.L.

(22d) *Chandlerella braziliensis* n.sp., from a green-billed toucan *Rhamphastos dicolorus* from Brazil is characterized by the presence of small pre-anal papillae which so far have not been recorded in other species. *Buckleyfilaria* Singh, 1949, is synonymous with *Pseudaprocta* Shikhobalova, 1930, as the type of *B. buckleyi* is devoid of the minute cuticular papillae described by Singh. It has clear distinct cordons at the cephalic end between the papillae and has a gubernaculum. *B. buckleyi* therefore becomes *P. buckleyi* (Singh, 1949) n. comb. R.T.L.

(22e) Southey reports on a series of pot tests to obtain more information about the host range of the tulip, narcissus and hyacinth races of *Ditylenchus dipsaci*. Heavy infestations were produced by the tulip and hyacinth races in the hyacinth, in *Scilla siberica* and in the bluebell and by the narcissus race in the daffodil, bluebell, snowdrop and onion. The Dutch iris was a doubtful host for the tulip and the hyacinth races and the snowdrop and the onion for the tulip race which infected the strawberry only lightly. *Matricaria matricarioides* is recorded as a new weed host of the narcissus race of *D. dipsaci*. R.T.L.

(22f) All the developmental stages of the microsporidian *Nosema helminthorum* have been found in naturally infected *Moniezia expansa* and *M. benedeni* in sheep in England, in *Moniezia* sp. in a buffalo calf in Pakistan and in experimentally infected *Hymenolepis nana* in mice and rats. Heavy concentrations of the spores at localized spots are illustrated; they give the appearance of miliary tubercles but are present only in the posterior segments of infected tapeworms. The infections although intense do not appear to be pathogenic. The Protozoa reported in the literature as parasitic in Trematoda, Cestoda, Nematoda and Acanthocephala, with their hosts, the names of the first reporters and remarks by Dissanaike, are set out in three tables. R.T.L.

(22g) Five species of tapeworms collected from *Rattus assimilis* in Queensland are identified as *Hymenolepis diminuta*, *Raillietina* (*R.*) *celebensis*, a misshapen cysticercus of *Taenia taeniaeformis* (these three are new host records for Australia), *Choanotaenia ratticola* n.sp., and *Hymenolepis australiensis* n.sp. *C. ratticola* n.sp. is the first record of a species of *Choanotaenia* in a rat. It differs from all other species of this genus in the size and shape of the 26 rostellar hooks, each 16–20 μ long, in the size of the cirrus pouch, 101–183 μ long, and of the egg capsules, 27–40 $\mu \times$ 36–45 μ, and in the absence of small spines at the base of the inconspicuous genital atrium where the cirrus, heavily armed with small spines, opens into it. *H. australiensis* n.sp., differs from other armed species by having 31 hooks, each 18–21 μ in size. It is the first species of the genus to be found in a rodent in Australia. R.T.L.

(22h) *Hymenolepis miniopteri* n.sp. from the bat *Miniopterus blepotis* in south Queensland differs from the other eleven species of this genus which occur in bats in the shape and number (20–25) and size range (14–16 μ) of the hooks and in the size of the cirrus pouch (114–137 $\mu \times$ 32–50 μ). R.T.L.

(22i) To the six known strigeid parasites of African crocodiles two new species are added from *Crocodylus niloticus* in Northern Rhodesia, viz., *Neoparadiplostomum magnitesticulatum* n.g., n.sp. and *N. kafuensis* n.sp. *Neoparadiplostomum* n.g. is placed in the Proterodiplostomatinae. Although its general morphology closely resembles that of the five known genera and agrees most closely with *Pseudoneodiplostomum*, it differs in the nature of the paraprostate and the arrangement of the genital ducts. *N. kafuensis* n.sp. has a smaller body and its posterior part is smaller and narrower than in *N. magnitesticulatum* n.sp. The range of the vitellaria and the sizes of the testes, ovary, bursa copulatrix and eggs also differ. R.T.L.

23—Journal of the Marine Biological Association of the United Kingdom.

a. LLEWELLYN, J. & GREEN, J. E., 1957.—" The occurrence at Plymouth of *Dictyocotyle coeliaca* Nybelin, 1941 (Trematoda: Monogenea)." **36** (1), 77–79.

(23a) Llewellyn & Green examined more than 1,000 specimens of four species of *Raia* for the presence of *Dictyocotyle coeliaca*. The trematodes were found in the coelom of 35 of the 135 *R. naevus* examined; there appeared to be no particular site of infestation. None of the 478 *R. clavata*, 420 *R. montagui* and 34 *R. brachyura* examined was infected. From this it appears that *D. coeliaca* is entirely restricted to *R. naevus* and that in the earlier record of it in *R. clavata* the host was wrongly identified. Although hitherto regarded as rare it appears, at Plymouth, to be at least as common as other monogenetic trematodes. S.W.

24—Journal of Parasitology.

a. RAUSCH, R. & JENTOFT, V. L., 1957.—" Studies on the helminth fauna of Alaska. XXXI. Observations on the propagation of the larval *Echinococcus multilocularis* Leuckart, 1863, *in vitro*." **43** (1), 1–8.
b. ROHRBACHER, Jr., G. H., 1957.—" Observations on the survival *in vitro* of bacteria-free adult common liver flukes, *Fasciola hepatica* Linn., 1758." **43** (1), 9–18.
c. HASKINS, W. T. & WEINSTEIN, P. P., 1957.—" Nitrogenous excretory products of *Trichinella spiralis* larvae." **43** (1), 19–24.
d. KATZ, F. F. & CARRERA, G. M., 1957.—" The reaction of *Schistosoma mansoni* egg shells to the periodic acid-Schiff staining procedure." **43** (1), 24.
e. HASKINS, W. T. & WEINSTEIN, P. P., 1957.—"Amino acids excreted by *Trichinella spiralis* larvae." **43** (1), 25–27.
f. HASKINS, W. T. & WEINSTEIN, P. P., 1957.—" The amine constituents from the excretory products of *Ascaris lumbricoides* and *Trichinella spiralis* larvae." **43** (1), 28–32.
g. DEWITT, W. B., 1957.—" Effects of *Schistosoma mansoni* infections on the ability of mice to digest and absorb dietary fats and proteins." **43** (1), 32.
h. ROBERTS, L. S., 1957.—" Parasites of the carp, *Cyprinus carpio* L. in Lake Texoma, Oklahoma." **43** (1), 54.
i. ROBINSON, Jr., E. J., 1957.—" A possible effect of testosterone on the development of *Schistosoma mansoni*." **43** (1), 59.
j. CHENG, T. C., 1957.—" Studies on the genus *Acanthatrium* Faust, 1919 (Trematoda: Lecithodendriidae); with the description of two new species." **43** (1), 60–65.
k. LEE, S. H., 1957.—" The life cycle of *Skrjabinoptera phrynosoma* (Ortlepp) Schulz, 1927 (Nematoda: Spiruroidea), a gastric nematode of Texas horned toads, *Phrynosoma cornutum*." **43** (1), 66–75.
l. GAMBINO, J. J., 1957.—" *Cyrtosomum penneri* n.sp. (Oxyuroidea; Atractidae)." **43** (1), 76–80.
m. CHANDLER, A. C. & PRADATSUNDARASAR, A., 1957.—" Two cases of *Raillietina* infection in infants in Thailand, with a discussion of the taxonomy of the species of *Raillietina* (Cestoda) in man, rodents and monkeys." **43** (1), 81–89.
n. BUCHANAN, G. D., 1957.—" Occurrence of *Cruzia americana* in Texas nine-banded armadillos." **43** (1), 92.
o. BULLOCK, W. L., 1957.—" *Octospiniferoides chandleri* n.gen., n.sp., a neoechinorhynchid acanthocephalan from *Fundulus grandis* Baird and Girard on the Texas coast." **43** (1), 97–100.
p. SILLMAN, E. I., 1957.—" A note on the effect of parasite burden on the activity of fish." **43** (1), 100.
q. HILL, C. H., 1957.—" The survival of swine whipworm eggs in hog lots." **43** (1), 104.
r. GRUNDMANN, A. W., 1957.—" Nematode parasites of mammals of the Great Salt Lake Desert of Utah." **43** (1), 105–112.
s. SCHWABE, C. W., 1957.—" A note on the *in vitro* development of *Nippostrongylus muris*." **43** (1), 112.
t. HERMAN, C. M., BAUMAN, P. M. & HABERMANN, R. T., 1957.—" The prevalence of *Eurytrema procyonis* Denton (Trematoda: Dicrocoeliidae) in some mammals from Maryland." **43** (1), 113–114.
u. MCNEIL, C. W. & WALTER, W. M., 1957.—" Surface-wintering of aquatic snails in Central Washington." **43** (1), 114–115.
v. JONES, A. W. & WYANT, K. D., 1957.—" The chromosomes of *Taeniarhynchus saginatus* (=*Taenia saginata*) Goeze, 1782." **43** (1), 115–116.

(24a) In a preliminary report Rausch & Jentoft describe and illustrate the proliferation of *Echinococcus multilocularis* vesicles in tissue culture tubes and confirm that the budding of the vesicles is exogenous. R.T.L.

(24b) Bacteria-free *Fasciola hepatica* were maintained, aerobically, alive and in excellent condition for three weeks and some survived for 30 days in 200 ml. of autoclaved liver extract, 800 ml. of AB solution (a new basic salt formula) and 10 ml. of injection crude liver. When kept under anaerobic conditions the flukes survived equally long but tended to contract, become less active and to lose colour more rapidly. *F. hepatica* can survive in solutions of glucose, fructose and glycerol and to a lesser extent in cholesterol, pyruvate and glutamic acid, but not in galactose, maltose, sucrose, ribose or sorbitol. R.T.L.

(24c) Chemical analysis of the soluble nitrogenous substances excreted by *Trichinella spiralis*, when aerobically incubated under axenic conditions, contained 33·3% ammonia nitrogen, 7·4% volatile amine nitrogen, 20·8% peptide nitrogen and 28·5% amino-acid

nitrogen; 10% was either undetermined nitrogen compounds or due to errors in the other determinations. R.T.L.

(24d) The egg-shells of *Schistosoma mansoni*, in sections of tissues of infected mice, did not become stained by the periodic acid-Schiff method although at times a substance adhering to the shell was strongly PAS-positive. R.T.L.

(24e) The amino-acids, identified by paper chromatography, in saline incubates of *Trichinella spiralis* larvae were glutamic acid, serine, glycine, alanine, tyrosine, valine, methionine, leucine, phenylalanine and proline. With few exceptions they were the same as those obtained by Rogers from adult nematodes. R.T.L.

(24f) When incubated for 24 hours under axenic conditions the larvae of *Ascaris lumbricoides* produced methyl, ethyl, propyl and butyl amines, cadaverine, ethanol amine and 1-amino-2-propanol. *Trichinella spiralis* larvae produced, in addition, amyl and heptyl amines, and ethylene diamine. R.T.L.

(24g) When fed on a semi-synthetic dry ration containing casein, sucrose, vegetable oil, salts and a vitamin mixture plus L-cystine, mice subsequently infected with *Schistosoma mansoni* were unable to utilize dietary fats and proteins as efficiently as the controls. R.T.L.

(24h) *Dactylogyrus extensus* occurred on the gills of 70% of 59 *Cyprinus carpio* from Lake Texoma. The only intestinal parasite present was *Camallanus ancylodirus*. Three specimens were found in two of the fish. R.T.L.

(24i) Mice which had been exposed to infection with *Schistosoma mansoni* cercariae were given a total of 26 mg. of crystalline testosterone in 23 injections over a period of 49 days. Schistosome eggs passed by some of these mice were used to infect molluscs and the resulting cercariae were then used to infect five mice. One mouse had died and from the surviving four the worms numbered 667 males, 434 females and 240 male-like hermaphrodites. As the total number of females and hermaphrodites was almost equal to the number of males the hermaphrodites might be considered to be reversed females. R.T.L.

(24j) From a study of the comparative measurements of various organs of twelve species of *Acanthatrium* it is concluded that the dimensions of the body and internal organs are not good criteria for separating the species. The generic description is amended and the subgenus *Mesothatrium* is eliminated. A key differentiates the 13 species of *Acanthatrium*, including two new species from *Eptesicus f. fuscus*, which are distinguished on the basis of the atrial spines, viz., *Acanthatrium amphidymum* n.sp. in which the spines are arranged in two horizontal chambers of the genital atrium and *A. oligacanthum* n.sp. in which the genital atrium is lined along one wall with nine minute spines in a row. A key is also given for the seven genera of Lecithodendriinae which occur in mammals. R.T.L.

(24k) When gravid females of *Skrjabinoptera phrynosoma*, a parasite of the Texas horned toad *Phrynosoma cornutum* and other lizards, are discharged from the body of the definitive host, they are carried by the Texas agricultural ants *Pogonomyrmex barbatus* var. *molefaciens* to their nests where the eggs become available to infect the entire larval ant population. The worm larvae occur in cysts about 0·633 mm. in diameter and measure 0·541 mm. in length. In young pupae the larvae are about 1·114 mm. long. Older cysts in the newly emerged ants averaged 4 mm. long while in adult worker ants they reached 5·93 mm. The cysts formed by the ant tissue contain fat droplets which are gradually consumed by the worm larvae. Repeated attempts to infect adult ants failed. R.T.L.

(24l) *Cyrtosomum penneri* n.sp. is described and figured from *Callisaurus draconoides gabbii*, *Sceloporus occidentalis biseriatus*, *S. graciosus vandenburgianus* and *Petrosaurus* sp. in California. The arrangement of the papillae and lips is basically similar to that in *C. scelopori* but the two sub-dorsal and the two sub-ventral lips each bear a prominent knobbed papilla

and there are two papillae, one medio-dorsal and one medio-ventral, which are absent in *C. scelopori*. There are six pairs of caudal papillae of which two are pre-cloacal. The spicules are unequal in length. R.T.L.

(24m) Three specimens provisionally named *Raillietina* (*R.*) *siriraji* n.sp., from two children in Bangkok, may possibly be identical with that previously reported from Bangkok by Leuckart in 1891 as *Taenia madagascarensis* and placed by López-Neyra (1954) in *Meggittia celebensis* (Janicki, 1902). The authors review earlier records of *Raillietina* in man and consider that the present policy of lumping all these together is liable to cause more confusion than simplification. R.T.L.

(24o) *Octospiniferoides chandleri* n.g., n.sp. is described and figured from the gulf killifish (*Fundulus grandis*) from East Bay, Gilchrist, Texas. It resembles *Octospinifer* but differs from all other Neoechinorhynchidae in that the basal row of hooks as well as the more anterior rows have prominent root plates. The proboscis is globular with eight to ten hooks in each of three circles. The female genital opening is nearly terminal. The male is unknown. R.T.L.

(24p) At autopsy on three healthy and vigorous fishes, viz., two common sunfish and one rock bass, experimentally infected some months previously with cercariae of *Azygia longa*, the livers were packed so closely with encysted metacercariae of *Posthodiplostomum minimum centrarchi* that little functional liver tissue remained. Yet their presence did not appear to have caused any inconvenience to the fishes. R.T.L.

(24q) Hill records observations on an old hog lot, near Beltsville, which until 1949 had been used for pigs for many years and had become heavily infested with eggs of *Trichuris suis*. After being fallowed for two years the ground was put under grass and in 1955 worm-free pigs were introduced. No whipworm eggs were found in the faeces for 50 days but thereafter all the pigs were passing eggs. The presence of *T. suis* was confirmed by autopsy. This experiment indicates that the eggs of *T. suis* had remained in the soil for at least six years. R.T.L.

(24r) Grundmann records the 23 species of nematodes found in 527 mammalian hosts belonging to 22 species collected in the Great Salt Lake Desert Region and notes their habitats and host distribution, parasitic population and incidence, and the seasonal distribution and inter-relationships of the hosts. R.T.L.

(24s) Third-stage larvae of *Nippostrongylus muris*, obtained by peptic digestion from the lungs of experimentally infected rats 48 hours after infection, survived at room temperature for over eight days in normal rat serum, grew in length and moulted to the fourth stage. But in immune rat serum similar larvae survived only two to three days, underwent no development and developed typical precipitates around their natural openings. R.T.L.

(24t) *Eurytrema procyonis* was recovered from the pancreatic ducts of raccoons and grey foxes in Maryland. The pancreas was enlarged, soft and spongy and pale yellowish-pink but the epithelial cells of the ducts showed no injury and the islets of Langerhans were normal. R.T.L.

(24v) Sections of proglottides of *Taenia saginata* and aceto-orcein squash preparations of dissected testes and parts of the uterus were examined for chromosomes. Only oocytes and young embryos gave clear pictures of mitosis and meiosis: the diploid chromosome number appeared to be 20. After reduction division there appeared to be four large V-shaped, three small V-shaped and two (possibly three) large J-shaped chromosomes ranging in size from 3 μ to 5 μ. The developing embryophore of older embryos contained many polyploid nuclei. S.W.

25—Meditsinskaya Parazitologiya i Parazitarnie Bolezni. Moscow.

a. SALATA, A. T., 1957.—[Reaction of the body to ascarid excretory products.] **26** (1), 74–77. [In Russian.]

b. BLYUGER, A. F., GAGAINE, A. E., DAKHOVKER, S. E., MINTSENGOF, L. A., RATENBERG, N. S. & CHARNI, S. D., 1957.—[Comparative results of the application of piperazine adipate and oxygen in the treatment of ascariasis.] **26** (1), 77–80. [In Russian: English summary p. 80.]

c. KROTOV, A. I. & TIMOSHIN, D. G., 1957.—[Trials of new preparations of vegetable origin against ascaridiasis in cats.] **26** (1), 80–82. [In Russian: English summary pp. 81–82.]

d. VASILKOVA, Z. G., 1957.—[Recent work on medical parasitology in Poland.] **26** (1), 87–92. [In Russian.]

e. AGAEVA, G. K., 1957.—[Experimental treatment of hymenolepiasis with acridine.] **26** (1), Suppl. p.63. [In Russian.]

f. BAGDASAROV, N. E., 1957.—[The use of naphthalene against enterobiasis.] **26** (1), Suppl. p.63. [In Russian.]

g. BALABO, A. N. & MESHBEIN, M. B., 1957.—[Experimental control of helminthiasis in mines.] **26** (1), Suppl. pp. 63–64. [In Russian.]

h. BATYUSHEVA, V. P., 1957.—[Severe cases of Opisthorchis infection of the liver.] **26** (1), Suppl. p.64. [In Russian.]

i. BELIOVSKAYA, T. S., SAARE, A. K. & YANES, K. Y., 1957.—[The distribution of helminthiases among separate population groups in Estonian SSR.] **26** (1), Suppl. pp. 64–65. [In Russian.]

j. BOGULSKAYA, K. E., 1957.—[Oxygen therapy of ascariasis.] **26** (1), Suppl. p. 65. [In Russian.]

k. BOLOTOV, M. P., 1957.—[The use of mixed sugar and salt solutions in testing for helminth eggs.] **26** (1), Suppl. p. 65. [In Russian.]

l. GORITSKAYA, V. V., 1957.—[Infection of fish in the Dnieper river with *Opisthorchis felineus* metacercariae.] **26** (1), Suppl. p. 65. [In Russian.]

m. DURSUNOVA, S. M., 1957.—[Experimental treatment of taeniasis with acridine.] **26** (1), Suppl. pp. 65–66. [In Russian.]

n. ERMAKOV, F. M., 1957.—[Experimental oxygen therapy under sanatorium conditions.] **26** (1), Suppl. p.66. [In Russian.]

o. ZIMIN, I. A. & LEDIN, G. P., 1957.—[Two cases of trichinelliasis in Sukhumi.] **26** (1), Suppl. p. 66. [In Russian.]

p. KARPOV, V. M., 1957.—[On the cases of local Diphyllobothrium infections in the town of Dzerzhinsk.] **26** (1), Suppl. p. 66. [In Russian.]

q. KARSHINA, L. E. & KARASEVA, A. N., 1957.—[Several cases of strongyloidiasis among the population of a village in the Volga Delta.] **26** (1), Suppl. p. 66. [In Russian.]

r. KISELEVICH, G. A., 1957.—[The pollution of market vegetables and fruit with geohelminth eggs in Lvov.] **26** (1), Suppl. p. 67. [In Russian.]

s. KRAVETS, N. P., 1957.—[The toxicity of oxygen to pig ascaris.] **26** (1), Suppl. p. 67. [In Russian.]

t. LEVIT, M. S. & LEBESHEVA, E. I., 1957.—[Opisthorchis infection in dogs and cats, and Trichinella infection in cats, dogs and rats at Kiev.] **26** (1), Suppl. p.67. [In Russian.]

u. MALINOVSKAYA A. A., 1957.—[A case of *Hymenolepis diminuta* infection.] **26** (1), Suppl. p. 67. [In Russian.]

v. MARKIN, A. V., 1957.—[Experimental control of hymenolepiasis in Nizhne-Tagil.] **26** (1), Suppl. p. 68. [In Russian.]

w. MARTINOV, V. F., 1957.—[Infection with *Opisthorchis felineus* metacercariae of fish in the Khanty Mansiysk district.] **26** (1), Suppl. p. 68. [In Russian.]

x. MARUASHVILI, G. M., SAKVARELIDZE, L. A. & MATIASHVILI, I. G., 1957.—[Trichinelliasis in Georgia.] **26** (1), Suppl. p. 68. [In Russian.]

y. MELASHENKO, V. F. & KELINA, A. M., 1957.—[The development of ascarid eggs after oxygen therapy.] **26** (1), Suppl. p. 68. [In Russian.]

z. MELASHENKO, V. F., 1957.—[The viability of free-living ascarid larvae.] **26** (1), Suppl. pp. 68–69. [In Russian.]

ba. MURKELINSKAYA, R. Y., 1957.—[Acridine treatment of *Taenia* infections.] **26** (1), Suppl. p. 69. [In Russian.]

bb. NERSESYAN, O. P., 1957.—[Experimental treatment of hymenolepiasis by a combined method (with diathermy).] **26** (1), Suppl. p. 69. [In Russian.]

bc. PARIBOK, V. P., 1957.—[The action of non-specific anthelmintics on the intestinal epithelium.] **26** (1), Suppl. pp. 69–70.

bd. PESTUSHKO, E. I., 1957.—[The survival and development of geohelminth eggs in the Dnepropetrovsk area.] **26** (1), Suppl. pp. 70–71. [In Russian.]

be. PROKOPOVICH, N. I., 1957.—[Study of the action of *Delphinium consolida* on parasitic worms of cats.] **26** (1), Suppl. p. 71. [In Russian.]

bf. SAMBORSKAYA, E. P., 1957.—[The effect of extracts of some helminths on the absorption of glucose from the intestine.] **26** (1), Suppl. 71. [In Russian.]

bg. SELIVANOV, K. P. & SHEVCHENKO, L. P., 1957.—[The epidemiology of trichinelliasis.] **26** (1), Suppl. p. 71. [In Russian.]

bh. SINOVICH, L. I., 1957.—[Helminthiases of the population in some districts of the Kamchatka and Okhotsk coast.] **26** (1), Suppl. p. 72. [In Russian.]
bi. SOLOMKO, B. V., 1957.—[The testing of acridine for the treatment of some cestode infections.] **26** (1), Suppl. p. 72. [In Russian.]
bj. TRAITELMAN, M. Y., 1957.—[Death from asphyxia due to occlusion of the larynx by ascaris.] **26** (1), Suppl. p. 72. [In Russian.]
bk. TROFIMOV, A. I. & TROFIMOVA, E. N., 1957.—[Experimental control of Diphyllobothrium infection in the Zaonezhsk district of Karelian ASSR.] **26** (1), Suppl. p. 72. [In Russian.]
bl. TUTKEVICH, S. M., 1957.—[Experimental treatment of Trichocephalus infections by an enema of a water-benzine mixture.] **26** (1), Suppl. p. 73. [In Russian.]
bm. FEDOROV, V. G., 1957.—[The transmission of helminth eggs by flies in Omsk.] **26** (1), Suppl. p. 73. [In Russian.]
bn. CHUN-SYUN, F., 1957.—[The epizootiology of Dioctophyme infection in dogs in Kazakhstan.] **26** (1), Suppl. p. 73. [In Russian.]
bo. SHEVCHUK, G. S., 1957.—[Infection of animals by inoculating with Trichinella.] **26** (1), Suppl. p. 73. [In Russian.]
bp. SHEKHTMAN, E. M., 1957.—[The helminth fauna of the population in the Petrovsk region of Karelian ASSR.] **26** (1), Suppl. pp. 73–74. [In Russian.]
bq. SHMIDT, T. A. & KORSUN, E. A., 1957.—[Strongyloidiasis in the Odessa region.] **26** (1), Suppl. p. 74. [In Russian.]
br. SHRAMKO, N. P., 1957.—[A case of an ascaris attached in the oesophagus.] **26** (1), Suppl. pp. 74–75. [In Russian.]

(25a) The intestinal wall acts as a barrier to the excretory products of ascarids and only when the normal structure is disturbed under the influence of these products do they enter the blood causing decrease of the pressure and the coagulation properties. No changes were observed in 8 out of 16 dogs, under narcosis, on introduction of toxic ascarid products into the intestine. In eight the blood pressure fell by 25–100% and two of these dogs died. The morphological changes in the intestinal wall were mainly desquamation and haemorrhages. G.I.P.

(25b) No untoward effects followed the treatment of patients with ascariasis by piperazine adipate. The percentage of cures was 75% to 80·9%, whereas of those treated with oxygen only 57·6% to 71·5% were cured. R.T.L.

(25c) Decoctions of the hemp nettle (*Galeopsis tetrahit*), the mallow (*Malva pusilla*), leaves of the beet (*Beta vulgaris*) and the juice of rowan berries (*Pyrus aucuparia*) caused the evacuation of 33% of the ascarids in infected cats. The fresh sap from the leaves of hazel (*Corylus avellana*) removed 90%. Decoctions of *Convolvulus arvensis*, *Populus nigra* leaves and buckthorn bark *Frangula alnus* were ineffective. R.T.L.

26—Medizinische Klinik.

a. GREUEL, D., 1957.—" Piperazin-Vergiftung bei therapeutischer Dosierung." **52** (4), 129–130.

(26a) Piperezine citrate given to two brothers at the rate of 138 mg. daily for four days produced abdominal pains, vomiting and staggering gait. Recovery was rapid after the cessation of treatment but the abdominal pains and staggering recurred when treatment was renewed about 14 days later. The symptoms disappeared within 48 hours. Greuel attributes these symptoms either to a family susceptibility or to some nutritional factor. R.T.L.

27—Nature. London.

a. SANDARS, D. F., 1957.—" Lungworm from rats captured in Britain." [Correspondence.] **179** (4550), 109–110.
b. CAMERON, G. L. & STAVELEY, J. M., 1957.—" Blood group P substance in hydatid cyst fluids." [Correspondence.] **179** (4551), 147–148.
c. SLINN, D. J., 1957.—" *Erpocotyle abbreviata* (Olsson, 1876) Price, 1942, a monogenetic trematode new to British waters." [Correspondence.] **179** (4553), 271–272.
d. ONIONS, T. G., 1957.—" Emergence of larvae from sealed cysts of the potato root eelworm, *Heterodera rostochiensis* Wollenweber." [Correspondence.] **179** (4554), 323–324.

e. ROGERS, W. P. & SOMMERVILLE, R. I., 1957.—" Physiology of exsheathment in nematodes and its relation to parasitism." **179** (4560), 619–621.
f. FAIN, A. & VANDEPITTE, J., 1957.—" A new trematode, *Poikilorchis congolensis* n.g., n.sp., living in subcutaneous retroauricular cysts in man from the Belgian Congo." [Correspondence.] **179** (4562), 740.
g. SOULSBY, E. J. L., 1957.—" Immunization against *Ascaris lumbricoides* in the guinea pig." [Correspondence.] **179** (4563), 783–784.
h. PETERS, B. G., 1957.—" Plant-parasitic nematodes." **179** (4566), 902–903.
i. ROSE, J. H., 1957.—" A record of the lungworm *Cystocaulus ocreatus* in sheep in Great Britain." [Correspondence.] **179** (4566), 925.

(27a) *Angiostrongylus cantonensis*, an oriental lungworm of rats, has spread to Australia. During a visit from Australia Sandars examined 24 *Rattus rattus* and 167 *R. norvegicus* caught in various English towns but found no evidence of the occurrence of this parasite in England. [The title is therefore misleading.] R.T.L.

(27b) In two out of 132 human cases of hydatid disease the sera contained strong anti-P agglutinins. Fluid taken from cysts of the liver of sheep showed no anti-P inhibition when scolices were absent. Probably the specific inhibiting substances are derived from the active germinal layer of the cyst wall. R.T.L.

(27c) *Erpocotyle abbreviata*, which has been found on the gills of the pike dogfish in the Skagerrak and at Roscoff but not in Britain, is now reported by Slinn from the gills of a male spur dog (*Squalus acanthias*) taken in the Irish Sea. R.T.L.

(27d) By sealing the mouth or the vulva of *Heterodera rostochiensis* cysts Onions has demonstrated that larval emergence through either of these openings was as rapid as through both apertures. Either opening adequately provided for the normal rate of hatching. R.T.L.

(27e) Rogers & Sommerville examined the process of exsheathment in third-stage larvae of trichostrongyle parasites of sheep. Exsheathment was stimulated by factors in rumen fluid. The stimulation was greatest at low oxidation-reduction potentials. The optimal hydrogen ion concentrations for the action of rumen fluid were as follows: *Haemonchus contortus*, *p*H 6.5 to 7.5; *Trichostrongylus axei*, *p*H 5 to 6; *T. colubriformis*, below *p*H 4. The action of the rumen fluid "triggered" the production of an "exsheathing fluid" by the larvae. Experiments with ligatured larvae suggested that the exsheathing fluid was produced by cells at the base of the oesophagus. The exsheathing fluid which was most active in the region of *p*H 7, was heat-labile and contained a dialysable co-factor. W.P.R.

(27f) *Poikilorchis congolensis* n.g., n.sp., has been found in cysts or abscesses in four natives of Kasai Province. It measures 7·6 mm. × 3·9 mm. The eggs, 0·063 mm. × 0·04 mm., are operculate and resemble those of *Paragonimus*. The testes are very irregular in shape. The caeca have numerous short folds. The receptaculum seminis is small, median and bilobate. The ovary is ovoid and the genital pore paramedian. The new genus belongs to the Achillurbainiidae. It is suggested that the instances of *Paragonimus* infection reported from the Cameroons by Libert (1932) and from southern Nigeria by Yarwood & Elmes (1943) may have been due to this parasite. R.T.L.

(27g) Soulsby has shown that guinea-pigs can be immunized against *Ascaris lumbricoides* by the subcutaneous injection of infective ova. Numbers far in excess of the lethal oral dose of ova can be administered in this way, 50,000 per guinea-pig being used in these experiments. Subsequent experiments with non-viable "vaccines" indicated that a saline extract of disintegrated infective ova and a saline solution of larval excretions and secretions were the most potent preparations for stimulating protective immunity. A further account is to be published elsewhere. S.W.

(27h) This annotation of a symposium held at the Linnean Society on 21st March, 1957, summarizes the three papers discussed, viz., on population studies on cyst-forming nematodes

by N. G. Hague & J. J. Hesling, on potatoes resistant to root eelworm by T. D. Williams and on the relation of *Aphelenchoides ritzema-bosi* to cauliflower disease of strawberries by R. S. Pitcher and J. E. Crosse. R.T.L.

(27i) Out of 310 sheep, from various parts of England, 293 were infected with *Muellerius capillaris* and 22 with *Cystocaulus ocreatus*. The incidence of *C. ocreatus* has since been found to be higher in sheep on the Wiltshire Downs. R.T.L.

28—Naturwissenschaften. Berlin.

a. FRIESHAMMER, J., 1957.—"Die Bildung und Weiterentwicklung der Dauerlarve von *Rhabditis strongyloides* (A. Schn., 1866) (Rhabditidae, Nematoda) und ihre auslösenden Faktoren." **44** (1), 20–21.

(28a) Frieshammer describes *Rhabditis strongyloides* dauerlarvae (which under certain environmental conditions can develop as an intermediate step between second and third-stage larvae). He shows that they are characterized by the elimination of the accumulations of "rhabditin granules" which are present in the intestine of first and second-stage larvae, and by a lengthening and narrowing of the mouth structure. Contrary to earlier views, lack of suitable food has nothing to do with the development of dauerlarvae. Experiments on the further development of dauerlarvae, using *Bacillus subtilis* cultures as nutrient media, have so far seemed to indicate that the degree of activity of the bacteria used has little if any influence. A.E.F.

29—Nematologica.

a. SOUTHEY, J. F., 1957.—"Observations on *Heterodera cacti* Filipjev et Sch. Stekhoven and *Meloidogyne* spp. on imported cactus plants with a list of new host records." **2** (1), 1–6. [German summary p. 6.]
b. DONCASTER, C. C., 1957.—"Growth, invasion and root diffusate production in tomato and black nightshade inoculated with potato-root eelworm." **2** (1), 7–15. [German summary pp. 14–15.]
c. FERRIS, V. R. & SIEGEL, B. M., 1957.—"Electron microscopy of golden nematode cyst wall." **2** (1), 16–18.
d. LORDELLO, L. G. E., 1957.—"Two new nematodes found associated with soy-bean roots." **2** (1), 19–24. [Portuguese summary pp. 23–24.]
e. SCHINDLER, A. F., 1957.—"Parasitism and pathogenicity of *Xiphinema diversicaudatum*, an ectoparasitic nematode." **2** (1), 25–31. [German summary p. 31.]
f. ALLEN, M. W., 1957.—"A review of the nematode genus *Trichodorus* with descriptions of ten new species." **2** (1), 32–62.
g. NOLTE, H. W. & DIETER, A., 1957.—"Nematoden an Baumschulgewächsen in Mitteldeutschland." **2** (1), 63–67.
h. TIMM, R. W., 1957.—"*Pterygorhabditis*, a remarkable new genus of soil nematodes." **2** (1), 68–71. [German summary p. 71.]
i. DROPKIN, V. H., 1957.—"A method for determination of the infectivity of *Heterodera rostochiensis* larvae." **2** (1), 72–75.
j. PEACOCK, F. C., 1957.—"Studies on root-knot nematodes of the genus *Meloidogyne* in the Gold Coast. Part I. Comparative development on susceptible and resistant host species." **2** (1), 76–84.
k. RASKI, D. J., 1957.—"*Trophotylenchulus* and *Trophonema*, two new genera of Tylenchulidae n. fam. (Nematoda)." **2** (1), 85–90. [German summary p. 90.]
l. SCHINDLER, A. F. & BRAUN, A. J., 1957.—"Pathogenicity of an ectoparasitic nematode, *Xiphinema diversicaudatum*, on strawberries." **2** (1), 91–93.

(29a) After reviewing records of the occurrence of *Heterodera cacti* and of some of its host species, Southey describes the finding of *H. cacti* on imported cactus plants in 1954–55. A complete list is given of the species of cactus infested with *H. cacti* and *Meloidogyne* spp. The morphology of the cysts and the structure of the vulval cone are described in detail. The article concludes with a chapter on practical considerations of the pest. J.J.H.

(29b) Observations are made on the variations in growth, root diffusate production and extent of root invasion by *Heterodera rostochiensis* in two series of tomatoes and black nightshade plants grown in pots. Nematode inoculation more seriously affected root development in tomato,

the more favourable of the two hosts, than it affected black nightshade. Both host species were invaded by *H. rostochiensis*, but while the nematodes developed to maturity in tomato, they failed to develop beyond the third larval stage in nightshade. Until the end of the first month of the experiment, tomato bore the greater density and the greater total number of nematodes in the roots. Thereafter there was a decline, probably due to maturation of the parasites, while the numbers in the nightshade roots continued to increase. The effect of nematode inoculation on tomato root diffusate output was to cause an apparently permanent reduction, while on nightshade it merely delayed the peak production of root diffusate. C.C.D.

(29c) Ferris & Siegel state that an exocuticle and an endocuticle are clearly visible in electron micrographs of ultra-thin sections of the cyst wall of the potato-root eelworm, *Heterodera rostochiensis*. The exocuticle appears to be composed of one material interspersed with a second material of greater density to electron scattering. A distinct banding is evident in the endocuticle. A fibrillar layer in the exocuticle, previously described from light microscope studies, was not detected by the electron microscope and its presence is questioned. H.R.W.

(29d) Lordello describes *Carcharolaimus formosus* n.sp. found around decaying soya bean roots. It has a dentate labial structure and differs from the other two species of the genus (*C. dentatus* and *C. pizai*) with this character in having a broader labial region and in the presence of pores along the ventral and lateral fields. It differs from *C. dentatus* also in the position of the vulva which is at 57·4% as compared with 48% in *C. dentatus* and in the absence of glandular bodies at the base of the oesophagus. From *C. pizai* it differs in being longer and slender (2,337 μ long and 50 μ wide as compared with 1,635 μ and 65 μ). No males were found. A key to the species of *Carcharolaimus* is given. A single female, also found round galled soya bean roots, is described and named *Dorylaimus bauruensis* n.sp. It is unlike any other described species of *Dorylaimus*, the outstanding feature being a series of pores situated on elevations along the lateral and ventral fields and connected with glandular cells in the longitudinal chords. Scale-like structures were observed in the tail region. The nematode is 782 μ long, 46·5 μ wide, spear 21·6 μ: a=16·8, b=3·9, c=22·4, V=46·7%. M.T.F.

(29e) By inoculating numbers of the dagger nematode, *Xiphinema diversicaudatum*, into sterile soil containing soya beans, Schindler was able to observe several specimens attached to the roots. In a similar way it was shown that this nematode causes galling on rose and peanut roots and inhibits the growth of host plants. Schindler concludes that *Xiphinema diversicaudatum* is a plant parasite and is pathogenic. H.R.W.

(29f) Allen redescribes the type species *Trichodorus primitivus* (de Man, 1880) Micoletzky, 1922 and together with *T. pachydermus* Seinhorst, 1944 describes ten new species. These are *T. monohystera* n.sp., *T. elegans* n.sp., *T. porosus* n.sp., *T. atlanticus* n.sp., *T. christiei* n.sp. (the "stubby-root nematode"), *T. aequalis* n.sp., *T. proximus* n.sp., *T. californicus* n.sp., *T. nanus* n.sp. and *T. obscurus*. n.sp. Differential diagnoses and a key to their identification are given. A bursa is present in *T. atlanticus*, *T. christiei* and *T. pachydermus*, but not in the other species where males are known. The onchiostyle is shown to be a dorsal tooth and not a hollow axial spear. All the species are figured. J.B.G.

(29g) Nolte & Dieter describe a method of examination of tree nurseries for nematode pests. Tylenchids and dorylaims were detected as parasites of stone fruits, pome fruits, some conifers and some decorative trees. J.J.H.

(29h) *Pterygorhabditis pakistanensis* n.g., n.sp. is described and figured from specimens found among damp rice straw in East Pakistan. The pharynx and oesophagus are rhabditid, the head asymmetrical with the lips on the right side well developed and sixteen cephalic setae of various sizes asymmetrically arranged. The cuticle is heavily ornamented with sclerotized transverse bars in longitudinal rows which interlock at either end in a diamond pattern. The pattern is found on both sides of the body which is winged on the dorsal and ventral sides. There is a flap of cuticle extending beyond the female anus. The bursate male tail bears nine

pairs of papillae. The spicules are long and paired and there is a short gubernaculum. [The obvious relationship to *Bunonema* is not mentioned.] J.B.G.

(29i) Dropkin describes a technique for subjecting tomato roots to invasion by larvae of *Heterodera rostochiensis*. About 80% of the larvae entered the roots by the end of the second day, after which little or no entry occurred. There was no difference in percentage infectivity if one, two or twenty-five larvae were added to a root tip. The infectivity of larvae declined with the length of their storage in water. There was no correlation between larval motility and infectivity. J.J.H.

(29j) Using a population of *Meloidogyne*, tentatively identified as *M. incognita* var. *acrita*, for inoculations on seven plant species, Peacock made observations on host reaction and rate of development of the parasites. In terms of host suitability it appeared that the most favourable host was tomato, followed by cowpea, tobacco, soya bean and maize. In *Crotalaria retusa* and *C. striata*, although larvae entered the roots and some swelling occurred, the nematodes failed to mature. Under the conditions of the experiment, in which the soil temperature was from 26°C. to 31°C., second generation larvae entered tomato roots within 30 days of the initial inoculation except after infested maize, when no larvae were found in subsequently grown tomatoes. In further host tests it was found that root-knot larvae failed to enter the roots of ground-nuts (*Arachis hypogaea*), while root-knots appeared after three weeks and egg masses after six weeks in *Crotalaria juncea*, *C. usaramoensis*, *Canavallia ensiformis* and *Stizolobium deeringianum*. Eleven varieties of maize were inoculated with root-knot larvae and a high degree of resistance was shown by a hybrid produced by crossing a Mexican line with an American sweet corn. Of three varieties of cowpea (*Vigna sinensis*) tested, one (Machakos) proved highly resistant. It is observed that in Ghana egg-masses are normally formed on the surface of roots. M.T.F.

(29k) A new family Tylenchulidae is proposed, characterized by a well developed short stylet in larvae and females, a lightly sclerotized head, a well defined oesophagus with the metacorpus greatly enlarged and elongated and enclosing the oesophageal glands, finely annulated cuticle, saccate females with a single ovary and non-bursate males. This family has two subfamilies, each with two genera, viz., Tylenchulinae Skarbilovich, 1947 with a posteriorly located excretory pore and a degenerate male stylet (*Tylenchulus* Cobb, 1913 and *Trophotylenchulus* n.g.), Sphaeronematinae Raski & Sher, 1952 with excretory pore near the nerve ring and the male stylet lacking (*Trophonema* n.g. and *Sphaeronema* Raski & Sher, 1952). *Trophonema* is characterized with type species *T. arenarium* (Raski, 1956) n. comb., syn. *Sphaeronema arenarium* [see Helm. Abs., **25**, No. 31p.]. *Trophotylenchulus* differs from *Tylenchulus* in the circumoral elevation of the lip region in larvae and females and in the less posterior position of the excretory pore. *Trophotylenchulus floridensis* n.g., n.sp. is described and figured from small galls on the roots of *Quercus falcata* in Florida. J.B.G.

(29l) Schindler & Braun show that *Xiphinema diversicaudatum* is a pathogen of strawberries and when present in sufficient numbers may seriously inhibit their growth. H.R.W.

30—New Zealand Journal of Agriculture.

a. GOLDSMITH, C. J., 1957.—" Internal parasites of poultry." **94** (1), 33–34.

31—Phytopathology.

†a. BOSHER, J. E. & NEWTON, W., 1957.—" *Pratylenchus penetrans* in clonal apple stocks." **47** (1), 4.
†b. CHAPMAN, R. A., 1957.—" Reaction of species of *Nicotiana* to species of root-knot nematodes." **47** (1), 5.
†c. DARLING, H. M., 1957.—" Control of the potato rot nematode in Wisconsin." **47** (1), 7.
†d. DARLING, H. M., FAULKNER, L. R. & WALLENDAL, P., 1957.—" Culturing the potato rot nematode." **47** (1), 7.

† Abstract of paper presented at the 48th Annual Meeting of the American Phytopathological Society, Cincinnati, December 6-8, 1956.

†e. ENDO, B. Y. & SASSER, J. N., 1957.—" The effectiveness of various soil fumigants for control of the soybean cyst nematode." **47** (1), 9.
†f. FASSULIOTIS, G., 1957.—" Role of the male in reproduction of the golden nematode." **47** (1), 11.
†g. FEDER, W. A. & FELDMESSER, J., 1957.—" Observations on the absence of an internal microflora of surface-sterilized *Radopholus similis*." **47** (1), 11.
†h. FELDMESSER, J. & FEDER, W. A., 1957.—" Survival of *Radopholus similis* in field soil subjected to drying and to elevated temperatures." **47** (1), 11.
†i. HOLLIS, J. P., 1957.—" Microbial host range of *Dorylaimus ettersbergensis*." **47** (1), 16.
†j. HOLLIS, J. P. & JOHNSTON, T., 1957.—" Microbiological reduction of nematode populations in water-saturated soils." **47** (1), 16.
†k. JENSEN, H. J. & HORNER, C. E., 1957.—" Peppermint decline caused by *Longidorus sylphus* can be controlled by soil fumigation." **47** (1), 18.
†l. KLEIN, H. H. & ALLISON, C. C., 1957.—" A rapid method of screening of nematocides in the greenhouse." **47** (1), 21.
†m. KRUSBERG, L. R. & NIELSEN, L. W., 1957.—" The influence of root-knot nematodes on the growth of Porto Rico sweetpotato." **47** (1), 21.
†n. NELSON, R. R., 1957.—" Resistance in corn to *Meloidogyne incognita*." **47** (1), 25–26.
†o. ROHDE, R. A. & JENKINS, W. R., 1957.—" Effect of temperature on the life cycle of stubby-root nematodes." **47** (1), 29.
†p. SHER, S. A., 1957.—" Response of roses to field fumigation for lesion nematode." **47** (1), 31.
†q. SPEARS, J. F., BALCOMBE, S. C. & HEMERICK, G., 1957.—" Detection of *Heterodera glycines* in North Carolina." **47** (1), 33.
†r. TARJAN, A. C. & FORD, H. W., 1957.—" A modified aceto-osmium staining method for demonstration of nematodes in citrus root tissues." **47** (1), 34.
†s. THOMASON, I. J., 1957.—" Influence of soil temperature on reproduction of *Meloidogyne* spp." **47** (1), 34–35.
†t. WEHUNT, E. J., 1957.—" Population trends of nematodes associated with white clover in Louisiana." **47** (1), 36.
†u. WILES, A. B., 1957.—" Resistance to root-knot nematode in cotton." **47** (1), 37.
†v. WILSON, J. D., 1957.—" A survey of the degree of host infestation by *Meloidogyne hapla* in a 10-acre field of muck planted to vegetables." **47** (1), 37.
†w. WINSTEAD, N. N. & BARHAM, W. S., 1957.—" Inheritance of resistance in tomato to root knot nematodes." **47** (1), 37–38.
x. FULTON, R. A. & McCLELLAN, W. D., 1957.—" Respiratory protective devices for agricultural pesticides." **47** (1), 56–57.
y. WINSTEAD, N. N. & SKOTLAND, C. B., 1957.—" Eradicant treatments for narcissus bulbs and gladiolus corms harboring soybean nematode cysts." **47** (2), 67–69.
z. THOMASON, I. J. & SHER, S. A., 1957.—" Influence of the stubby-root nematode on growth of alfalfa." **47** (3), 159–161.
ba. BIRCHFIELD, W., 1957.—" Observations on the longevity without food of the burrowing nematode." **47** (3), 161–162.

(31a) Bosher & Newton found that the use of layering methods in the propagation of apple stocks favoured the spread of *Pratylenchus penetrans*. Whereas the nematode was found in 83% to 100% of maiden stocks of East Malling VII and IX from an infested bed only 23% of seedling stocks were infected; the degree of infestation of the soil in which the seedlings were grown is, however, unknown. Where the nematode population exceeded 80 per gramme of root conspicuous root injury resulted in two-year-old stocks. Nemagon at 10–40 gal. per acre applied during the dormant period reduced the total nematode population but did not eradicate *Pratylenchus*. Dosages of 15 or 20 gal. per acre applied during active growth caused severe yellowing of the foliage and reduced growth. S.W.

(31b) Chapman has tested 34 named species of *Nicotiana*, grown separately in pots in a green-house, for susceptibility to four species of *Meloidogyne*. Galls and egg-masses were produced by *M. arenaria* in 13 species, by *M. hapla* in 23 species, by *M. incognita* in 20 species, and by *M. javanica* in 17 species. Galls but no egg-masses were formed by *M. arenaria* in five species, by *M. hapla* in one, by *M. incognita* in two and by *M. javanica* in three. No galls or egg-masses were produced by *M. incognita* in two species. R.T.L.

†Abstract of paper presented at the 48th Annual Meeting of the American Phytopathological Society, Cincinnati, December 6–8, 1956.

(31c) Darling has found that a split application of ethylene dibromide (4 gal. per acre on the first treatment and 2 gal. per acre on the second) gave the most promising results in the control of *Ditylenchus destructor* in potato. S.W.

(31d) Darling & his co-workers describe two techniques by which large populations of *Ditylenchus destructor* may be developed in culture in three to four months. In the first, uncontaminated nematodes were introduced on to growing, undifferentiated tissue of potato, carrot, clover and tobacco on a modified White's nutrient agar medium. In the second it was found that the nematode populations would develop in 37 species of 15 genera of fungi [unnamed in the authors' abstract] growing on standard potato-dextrose agar. Individual cultures, developed from single gravid females, have been maintained since 1954. S.W.

(31e) Endo & Sasser have tested the following soil fumigants for control of *Heterodera glycines*: D-D mixture (at 20, 40 and 60 gal. per acre), Dowfume W-85 (at 4½, 9 and 13½ gal. per acre), methyl bromide (at 1, 2 and 3 lb. per 100 sq. ft.), Nemagon (at 3 and 5 gal. per acre) and Telone (at 20 and 40 gal. per acre). All were applied four weeks before seeding. No larvae were recovered from the plots one month after treatment with methyl bromide, D-D (at 40 or 60 gal. per acre) or Telone (at 40 gal. per acre) and, although viable eelworms were later recovered from these plots the numbers were much smaller than in the control plots. All treatments but W-85 (at 13½ gal. per acre) and Telone (at 20 gal. per acre) resulted in significantly lower white cyst counts than the controls. There appeared to be an inverse correlation between high cyst counts and nitrogen nodule formation. S.W.

(31f) Fassuliotis has demonstrated experimentally that although development of female *Heterodera rostochiensis* proceeded normally to the fifth stage and cyst formation in the absence of males, no embryonated eggs were found in the cysts. This indicates that the definitive shape of the female is not dependent on fertilization and that *H. rostochiensis* is incapable of parthenogenesis. S.W.

(31g) Feder & Feldmesser cleaned the surface of *Radopholus similis* by soaking the eelworms in 1 : 1,000 mercuric chloride, followed by three serial washings and centrifugations in sterile distilled water. Eelworms so treated were fully infective when placed on citrus roots and retained their motility for three weeks on various sterilized agar media on which they were unable to feed. No bacteria or fungi grew from intact eelworms or from those cut aseptically after being placed on the media. S.W.

(31h) Soil naturally infested with *Radopholus similis* was exposed to direct sunlight; temperatures and moisture contents were recorded at regular intervals. *R. similis* survived after 27 hours, during which the moisture fell from 3% to 0·9% and the temperatures were over 100°F., for 12 hours (maximum 115°F.), and after 45 hours where the moisture fell from 2% to 0·5% and the temperatures were over 100°F. for 2 hours 45 minutes (maximum 109°F.). S.W.

(31i) Hollis has shown that of the microbial hosts of *Dorylaimus ettersbergensis*, *Chroococcus* sp. was the most effective; the others, in order of decreasing efficiency were *Chlorella vulgaris*, *Drepanomonas* sp. and *Cephalothecium* sp. S.W.

(31j) Hollis & Johnston, working with *Tylenchorhynchus martini* and *T. acutus*, have shown that saturation of unsterilized soil with water produced a more pronounced reduction in nematode populations than in unsterilized moist soil or sterilized water-saturated soil. S.W.

(31k) Jensen & Horner tested Vapam, D-D mixture, ethylene dibromide, Nemagon, DCB-60 and formalin for the control of *Longidorus sylphus* on peppermint. In 1955 plants on some of the treated plots made approximately 16 times more growth than the controls and although the differences in growth were not as great in 1956 they were still statistically significant. D-D (injected at 50 gal. per acre), ethylene dibromide (injected at 7 gal. per acre) and Nemagon (injected at 3 gal. per acre or granules equivalent to 2 gal. per acre) gave the best results as measured by weight of hay obtained. S.W.

(31l) In this technique a sand, loam and peat mixture is infected with *Meloidogyne* sp., then treated with the chemical to be tested and placed in containers; when fumigants are used the containers should be covered for a short time with Saran Wrap. Following this period four-day-old cucumber seedlings are transplanted into treated and untreated soil and root-knot severity assayed about seven days later. S.W.

(31m) By treating alternate rows with D-D mixture in land heavily infested with *Meloidogyne incognita* var. *acrita* and then planting with Porto Rico sweet-potato, Krusberg & Nielsen have shown that plants grown in the untreated soil had larger root-knot indices, smaller top and root weights and fewer enlarging roots than those grown in treated rows; roots which were formed were also more severely malformed and cracked. S.W.

(31n) Nelson has tested maize inbreds and single crosses for resistance to *Meloidogyne incognita*. Although some inbreds were highly susceptible others appeared to have some resistance, only a few small galls being produced; some lines, although heavily galled showed little or no loss in root weight, indicating that they might be tolerant. Amongst the single crosses each was at least as susceptible as the more susceptible inbred which comprised it. S.W.

(31o) In experiments on the effect of temperature on the life-cycle of *Trichodorus* sp. in tomato seedlings, Rohde & Jenkins found that the cycle was completed in 16 to 17 days at 30°C. and in 21 to 22 days at 22°C. No larvae were recovered from seedlings kept at 35°C. and at 20°C. the number of gravid females did not increase. All stages found were larger at the lower temperatures. S.W.

(31p) *Pratylenchus vulnus* is wide-spread on poorly growing roses in southern California. A heavily infested field was treated with various soil fumigants before planting. Nine months after planting all those grown on treated soil showed a visible response compared with the controls. The average dry weights in grammes of 10 plants from each treatment were: chloropicrin, 82; Dowfume W-85, 71; D-D mixture, 70; Vapam injection, 59; Vapam drench, 39; control, 30. Roots were correspondingly larger and cleaner than those of the control plants. S.W.

(31q) During 1956 more than 100,000 acres of soya beans in eastern North Carolina were inspected for symptoms of *Heterodera glycines* infection. Five infested properties were discovered extending the limits of the area of infestation three miles east, three miles west and seven miles north. Symptoms of attack were visible on snap bean and soya bean foliage six weeks after planting where the pre-planting cyst count had been between five and 200 per lb. of soil, and 12 weeks after planting where the count had been one cyst per lb. Where the count was one cyst per 10 lb. soil per acre no symptoms were observed. S.W.

(31r) In this technique for demonstrating nematodes in plant tissue, citrus roots, fresh or preserved, are immersed for two hours at 52°C. in a covered jar in a solution of 16 parts distilled water, ten parts 10% acetic acid and two parts 2% aqueous osmium tetroxide. The roots are then washed in running water for at least an hour and bleached in 10% to 30% hydrogen peroxide for a few seconds. This is followed by several washings in water and then by dehydration at 52°C. in 70%, 95% and absolute ethyl alcohol. The roots are then cleared in methyl salicylate at 52°C. and direct observation of the nematodes is frequently possible after 30 minutes. S.W.

(31s) Thomason has studied the effect of temperature on the reproduction of *Meloidogyne incognita* var. *acrita*, *M. javanica* and *M. hapla* on tomato. All populations tested of all three species reproduced at 20°C., 25°C. and 30°C. At 35°C. reproduction of *M. hapla* was extremely limited and inconsistent, that of two populations of *M. incognita* var. *acrita* and one of *M. javanica* was markedly reduced. Reproduction of the same population of *M. javanica* was slightly depressed at 20°C. Egg masses produced by *M. javanica* and *M. incognita* var. *acrita* at 35°C. were viable. S.W.

(31t) During 1955–56 nematode populations in white clover in a field plot experiment were determined monthly and plant growth was assayed every four months. Maximal plant growth occurred during January to June and the nematode populations were highest during this period. The general trend of populations of *Pratylenchus* and *Tylenchorhynchus* varied with the period of maximal growth. S.W.

(31u) Four varieties of *Gossypium hirsutum* which are resistant to Fusarium wilt and one (Fox) which is susceptible were tested for resistance to *Meloidogyne incognita*, *M. incognita* var. *acrita*, *M. arenaria*, *M. javanica* and *M. hapla*. *M. incognita* was slight on Auburn 56, Coker 100 Wilt, Alabama hybrid 81–14 and Empire and moderate on Fox; *M. incognita* var. *acrita* was moderate on Auburn 56 and severe on the other four. No visible galling was caused by *M. arenaria*, *M. javanica* and *M. hapla* on any of the varieties tested. *G. barbadense* var. *darwinii* was highly resistant to *M. incognita* var. *acrita* but the F_1 progeny of crosses between *G. hirsutum* and *G. barbadense* var. *darwinii* were susceptible. S.W.

(31v) A ten-acre field of muck was known to be heavily but unevenly infested with *Meloidogyne hapla*. It was divided into about 250 plots and the whole field planted with alternating six foot strips of carrot, onion, celery and potato; five dwarf tomato plants were set among the celery plants in each plot as a further index of infestation. The degree of infestation on carrots varied from less than 5% to 80% or more within a distance of 50 ft. as did also that for celery and tomato. One area planted with onions for four successive years was almost free from eelworm damage whereas adjacent plots previously planted to celery and/or carrots showed a heavy infestation in 1956. S.W.

(31w) A breeding line of tomato (Hawaii 5229) has been found resistant to *Meloidogyne incognita* var. *acrita*, *M. incognita*, *M. arenaria* and *M. javanica* and susceptible to *M. hapla*. From inoculation experiments with the resistant line, a susceptible line, F_1 and F_2 generations of a cross between the two lines and backcrosses of the F_1 to each parent, Winstead & Barham confirm that resistance to *M. incognita* is monofactorial. The data also indicated that the same gene controlled resistance to all four *Meloidogyne* species and that resistance is incompletely dominant. S.W.

(31x) Fulton & McClellan have tested a number of respirator units for the protection afforded by them against a number of fungicides, insecticides and nematicides. They describe their use and stress that they are not a substitute for essential precautions. They list the practices which are highly important in the use of respirators and point out their limitations and the conditions under which they do not provide protection. S.W.

(31y) [This is a fuller account than that given in the authors' abstract which appeared in *Phytopathology*, 1956, **46**, p. 31. For abstract see Helm. Abs., **25**, No. 29bb.]

(31z) In two experiments lucerne, var. California Common, was grown in steam-pasteurized sandy loam inoculated with *Trichodorus* sp. at rates of 1,075 and 2,550 nematodes per plant respectively. Dry weights of foliage were 32% and 88% below those of the non-inoculated plants in the two experiments. The roots of the plants grown in infested soil were stunted, and had reduced feeders and arrested growth of the laterals. Fungi were present on the roots of both control and inoculated plants. The results indicate that *Trichodorus* sp. is the primary pathogen. M.T.F.

(31ba) Laboratory and field experiments showed that *Radopholus similis* survived for only 66 days in water and could not be recovered alive from infested soil and roots after four months in the field or in temperature tanks held at 74–76°F. J.B.G.

32—Plant Disease Reporter.

a. REED, J. P., HUTCHINSON, M. T. & RACE, S. R., 1957.—" A new, permanent method for mounting plant parasitic nematodes." **41** (1), 25–26.

b. MORGAN, O. D., 1957.—" Control of fusarium wilt and root-knot nematode of tobacco with soil fumigants." **41** (1), 27–32.
c. FEDER, W. A. & FELDMESSER, J., 1957.—" Additions to the host list of *Radopholus similis*, the burrowing nematode." **41** (1), 33.
d. EPPS, J. M., 1957.—" Soybean cyst nematode found in Tennessee." **41** (1), 33.
e. FORD, H. W., 1957.—" A source of controlled vacuum for pipetting nematodes." **41** (2), 89–90.
f. GOLDEN, A. M., 1957.—" Occurrence of *Radopholus gracilis* (Nematoda: Tylenchidae) in the United States." **41** (2), 91.
g. MINZ, G., 1957.—" Free-living plant-parasitic and possible plant-parasitic nematodes in Israel." **41** (2), 92–94.
h. LEYENDECKER, P. J., SMITH, A. L., COOPER, W. E. & LETT, L., 1957.—" Reduction in yield of cotton caused by diseases in 1956." **41** (2), 124–127.
i. KINCAID, R. R. & GAMMON, Jr., N., 1957.—" Effect of soil *p*H on the incidence of three soil-borne diseases of tobacco." **41** (3), 177–179.
j. THOMASON, I. J. & SMITH, P. G., 1957.—" Resistance in tomato to *Meloidogyne javanica* and *M. incognita acrita*." **41** (3), 180–181.
k. JENKINS, W. R. & COURSEN, B. W., 1957.—" The effect of root-knot nematodes, *Meloidogyne incognita acrita* and *M. hapla*, on fusarium wilt of tomato." **41** (3), 182–186.
l. SOMERVILLE, Jr., A. M., YOUNG, Jr., V. H. & CARNES, J. L., 1957.—" Occurrence of plant parasitic nematodes in soil and root samples from declining plants in several States." **41** (3), 187–191.
m. MILLER, P. M., 1957.—" Cheap, disposable filters for nematode surveys." **41** (3), 192–193.
n. MILLER, P. M., 1957.—" A method for the quick separation of nematodes from soil samples." **41** (3), 194.
o. MANZELLI, M. A. & YOUNG, Jr., V. H., 1957.—" Tolerance of plants to V–C 13 nemacide." **41** (3), 195–200.
p. HEGGE, A. H., 1957.—" Soybean cyst nematode in Missouri." **41** (3), 201.
q. JENSEN, H. J., LORING, L. B. & LEWIS, J., 1957.—" Sugar beet nematode found in the Ontario-Nyssa area of Oregon." **41** (3), 201.
r. CHRISTIE, J. R., 1957.—" The yellows disease of pepper (*Piper*) and spreading decline of citrus." **41** (4), 267–268.
s. ESSER, R. P., 1957.—" An improved post Baermann funnel technique." **41** (4), 269–270.
t. YOUNG, Jr., V. H., SOMERVILLE, Jr., A. M. & CARNES, J. L., 1957.—" Nematode control in potted ornamentals with V–C 13 nemacide." **41** (4), 271–277.

(32a) The authors describe a modified Berlese Fluid medium for mounting nematodes. The mountant is sufficiently viscous to make the presence of cover slip supports unnecessary. Nematodes mounted in the fluid and viewed with a phase microscope show especially clearly glandular organs and cuticular derived structures. J.J.H.

(32b) Following a review of the relevant literature, Morgan describes experiments on soil fumigation with the nematicides ethylene dibromide and D-D mixture in tobacco fields where root-knot nematodes (*Meloidogyne* spp.) and fusarium wilt (*Fusarium oxysporum* var. *nicotianae*) were both present. Fumigation resulted in considerable control of the wilt disease. There was a marked increase in yield in three tests where EDB was used at 5 gallons per acre and it was also effective when used as a split treatment of two 2½-gallons applications with an interval of two weeks between. D-D at 20 gallons per acre gave significantly reduced percentage wilt and root-knot index at harvest as compared with controls. The root-knot nematode populations were moderate to abundant on treated plots at harvest. M.T.F.

(32c) In view of the importance of *Radopholus similis* as a parasite in Florida, twenty-four field and vegetable crops were tested as hosts in pot trials. Twenty of the plants were found to be hosts of which nineteen are new records. These are carrot, beet, bean, tomato, squash, maize, white clover, black-eye pea, pepper, okra, radish, cantaloup, broccoli, watermelon, rye, Bahia grass, Bermuda grass, Carpet grass and lucerne. Hairy indigo was also a host. Kale, lettuce, turnip and *Crotalaria spectabilis* were resistant. [Apart from *Crotalaria* only common names are quoted.] J.B.G.

(32d) The soya bean cyst nematode *Heterodera glycines* has been found in Lake County, U.S.A. on roots of soya beans. The infestation covers a considerable acreage and the nematode was found in soil varying from very sandy to heavy. J.J.H.

(32e) Ford describes a micropipette apparatus which maintains a constant, controllable suction. The apparatus can be used for picking up nematodes from a dish of mixed specimens. H.R.W.

(32f) *Radopholus gracilis*, previously only reported from Russia and Europe, has been found for the first time in the U.S.A. in moist river bank soil in California. It was in soil associated with roots of *Sparganium greenei*, *Scirpus paludosus* and *S. americanus*. The nematode was also found within the roots of *Sparganium greenei* though no root symptoms were discernible. J.B.G.

(32g) Twenty-two genera of nematodes, being free-living plant-parasitic and possible plant-parasitic nematodes, derived from forty-four plant species and the surrounding soil are recorded from various localities throughout Israel. Eleven genera of non-parasitic eelworms are also recorded. J.B.G.

(32h) Root-knot disease of cotton, caused by *Meloidogyne* sp., is estimated to have caused losses of from 0·5%–4% in 1956 in 14 States of the U.S.A. Over the five-year period 1952–56 the average loss is estimated to be 206,360 bales (1·34%), the total loss from all diseases considered being 10·42%. M.T.F.

(32i) Field plot experiments by Kincaid & Gammon showed that the incidence of blackshank (*Phytophthora parasitica* var. *nicotianae*) on susceptible and resistant varieties of tobacco varied directly with soil *p*H. The incidence of some eelworm parasites, *Meloidogyne* sp. and *Pratylenchus* sp., varied inversely with soil *p*H. H.R.W.

(32j) Resistance to *Meloidogyne incognita* var. *acrita* in a tomato line (HES4857) derived from a cross of *Lycopersicon esculentum* × *L. peruvianum* was found to be governed by a single dominant gene. An F_3 line from a back cross of HES4857 with *L. esculentum* was resistant to both *M. incognita* var. *acrita* and *M. javanica*. It is considered probable that a single dominant gene confers resistance to both root-knot species. M.T.F.

(32k) Experiments were made to test the effects of a combination of the tomato wilt fungus (*Fusarium oxysporum* f. *lycopersici*) and one of the root-knot nematodes (*Meloidogyne incognita* var. *acrita* or *M. hapla*) on three tomato varieties with varying resistance to wilt. The susceptible variety Red Beefsteak became 100% wilted in 15 days with or without root-knot nematodes. The partly resistant variety Rutgers showed 60% wilted plants in 22 days in the absence of root-knot and 100% in 17 days in the presence of either root-knot species. Chesapeake showed no wilted plants with *Fusarium* alone but 100% wilt in 26 days when *M. incognita* var. *acrita* was present and 60% wilt in 26 days when *M. hapla* was present. Artificial wounding of the roots of plants inoculated with *Fusarium* alone resulted in wilting in all Red Beefsteak and Rutgers plants but in none of the Chesapeake plants. Root-knot nematodes alone caused reduction in growth of all plants. Saprophagous nematodes had no effect on the incidence of wilt. It is suggested that root-knot nematodes not only provide entry for the wilt fungus into the roots but also lower the host resistance. M.T.F.

(32l) The authors examined five hundred soil samples from boxwood, roses, trees and turf and found fourteen genera of plant-parasitic nematodes, of which *Pratylenchus* spp., *Helicotylenchus* spp. and *Rotylenchus* spp. were most frequent and wide-spread. J.J.H.

(32m) Miller describes the use of a paper facial tissue as a filter for the rapid filtration of nematodes from soil. The tissue paper is fixed over the end of a 5-ounce paper cup and the resulting filter is stronger, cheaper and more efficient than other filters in standard use. H.R.W.

(32n) Miller describes a modification of the centrifugal-flotation method of Caveness & Jensen for the separation of nematodes from soil samples. Instead of allowing the nematodes to settle in water after centrifuging, Miller pours the supernatant containing nematodes on to a

325-mesh sieve, from which the nematodes are washed. By this method nematodes can be examined 15 to 20 minutes after receipt of the soil samples. H.R.W.

(32o) V-C 13 nemacide (an emulsifiable concentrate containing 75% of *o*-2,4-dichlorophenyl-*o*, *o*-diethyl phosphorothioate, which is used for soil nematode control) was tested on ornamentals, trees, grasses, field and truck crops. Of these 93 species were found to be tolerant to the chemical, which was applied at various dosages by several methods. J.J.H.

(32p) The soya bean cyst nematode *Heterodera glycines* Ichinohe was found in Pemiscott County and Lake County in the State of Missouri. J.J.H.

(32q) The sugar-beet eelworm, *Heterodera schachtii*, has been found in the Ontario-Nyssa area of Oregon. Jensen and colleagues have thus established that all the major areas growing beet in Oregon are now infested with this eelworm. H.R.W.

(32r) Christie confirms that the yellows disease of pepper, *Piper nigrum*, is causing tremendous damage on the island of Banka off the coast of Sumatra and that probably 90% of the industry has already been destroyed. He accepts Van der Vecht's conclusion that the disease is caused by *Radopholus similis*. The field appearances of pepper yellows and of spreading decline in citrus trees are essentially the same, the only differences being the plant hosts and their geographical distribution. R.T.L.

(32s) In an improved procedure for the separation and microscopical examination of nematodes water is drawn from the Baermann funnel into a centrifuge tube. After standing for 15 to 20 minutes in a test tube rack, to allow the nematodes to settle, the centrifuge tube is placed under a dissecting microscope and the worms are transferred to a slide by a pipette 5 to 6 mm. inside diameter drawn out to a long tapering point with an aperture of 0·5 mm. R.T.L.

(32t) Root-knot, spiral and meadow nematodes in potted boxwood, Japanese holly and privet plants were controlled by V-C 13 nemacide—an emulsifiable concentrate containing 75% of *o*-2, 4-dichlorophenyl *o*, *o*-diethyl phosphorothioate—when applied as a drench or mixed with the soil at the rate of 5 ml. per cubic foot of soil. The treatment caused no phytotoxicity. The degree of control varied with the species and the method of application. R.T.L.

33—Plant Pathology. London.

a. BRYDEN, J. W. & HODSON, W. E. H., 1957.—" Control of chrysanthemum eelworm by parathion." **6** (1), 20–24.

(33a) A satisfactory degree of control of *Aphelenchoides ritzema-bosi* on early chrysanthemum varieties grown outdoors resulted from two sprayings with 0·005% parathion given when the cuttings had become established and one month later. A third spray did not increase the effect. Pot-grown mid and late-season varieties were treated in seven different ways involving the use of two strengths of parathion in various combinations for watering the stools before taking the cuttings, for watering the unrooted cuttings and as sprays after rooting and one month later. Results indicated that the strength of parathion was immaterial between 0·005% and 0·025% and that stool treatment followed by two sprays is inferior to cutting treatment and two sprays, the latter being apparently the most effective means of control. Observations suggest that treatment with parathion must be repeated every year and that chrysanthemum rust increases when warm-water treatment of stools is given up. Schradan sprays at 0·25% were ineffective. M.T.F.

34—Proceedings of the Alumni Association, Malaya.

a. HOEPPLI, R., 1957.—" Ancient views regarding parasitic infections held by the indigenous population of Fiji and Tahiti." **10** (1), 3–13.

(34a) Early native views on the causes of parasitic infections still current in the South Pacific Islands are essentially similar in some respects to those held in British North Borneo,

Brunei, Sarawak and Malaya and to those expressed in old Chinese literature. In Fiji and Tahiti filarial lymphangitis and elephantiasis are attributed to humidity, water and especially to living in wet areas. The belief that the urine of a patient with elephantiasis may spread the disease is still wide-spread in Tahiti. R.T.L.

35—Proceedings of the Zoological Society of London.

a. INGLIS, W. G., 1957.—" The comparative anatomy and systematic significance of the head in the nematode family Heterakidae." **128** (1), 133–143.

(35a) Detailed study of the heads of Heterakidae shows that they all conform to one basic type. Those species with a cephalic cap are placed in a separate family Aspidoderidae n.fam. and this family in subdivided into (i) Aspidoderinae Skrjabin & Shikhobalova, 1947 for *Aspidodera*, *Ansiruptodera* and *Sexansodera* which have cephalic cordons and complex lateral lobes and (ii) Paraspidoderinae n.subf. for *Paraspidodera* which lacks cordons and has simple lateral lobes. A new generic diagnosis is given for *Gireterakis*. *Hystrix cristata* is a new host for *G. girardi*. Examination of the types of *Paraspidodera uncinata* (Rud., 1819) shows that the description given by Travassos (1914) is correct. The head of *P. sellsi* Morgan, 1927 differs so greatly from that of *P. uncinata* that its position in *Paraspidodera* is doubtful. R.T.L.

36—Revista Ibérica de Parasitología.

a. FERNÁNDEZ AMELA, T. E., 1957.—" Una prueba de floculación para el diagnóstico de la ascaridiosis." **17** (1/2), 31–107.
b. RODRÍGUEZ GALLEGO, C., 1957.—" Primeros casos de cenurosis humana en España. Nota previa." **17** (1/2), 109–111.
c. GUEVARA POZO, D., 1957.—" Las fases iniciales en el desarrollo del *Ascaris lumbricoides* del cerdo. I. Estudio de las cubiertas del huevo, con algunas aportaciones experimentales." **17** (1/2), 117–148.

(36a) Fernández Amela gives details of the preparations, general properties and reactions to mammalian sera of three Ascaris antigens for flocculation tests, viz., AO, AO-L [for abstract of paper describing their preparation see Helm. Abs., **24**, No. 285a] and A-S-K, prepared by the method of Suessenguth & Kline for *Trichinella* antigen. AO had smaller, more uniform particles than A-S-K and was more sensitive and stable. AO-L was the most sensitive and uniform in reaction but did not keep well. Using AO-L Fernández Amela demonstrated the greatest concentration of antibodies in six rabbits 15–25 days after infection with pig Ascaris and found some sera negative on the 70th-75th days. All of 31 persons voiding Ascaris eggs were positive to the AO-L test and, of 31 not passing Ascaris eggs but having had previous infections, only six were negative. In nearly every instance sera reacted more readily if kept at 56°C. for 30 minutes. M.McK.

(36b) The subcutaneous nodules reported in a man by Gay Prieto in *Medicina Ibera* in 1930 are considered to have been *Coenurus serialis* and not hydatid, thus constituting the first record of *Coenurus* in man in Spain. A cerebral case of polycephalous cyst reported by Ley Gracia, in an address in 1948, as a cysticercus is shown to have been *Coenurus cerebralis*. M.McK.

(36c) Guevara Pozo reviews previously reported studies on the egg-shell of *Ascaris lumbricoides*. He observed that the chitinous coat appears as the eggs enter the uterus. They travel through the uterus in a gelatinous mass and emerge towards the vagina with the albuminoid coat. Aqueous solutions of sodium hypochlorite, of 3·75% to 15% concentrations, were found to dissolve the albuminoid coat. If these solutions were of sufficient strength, or acted for sufficient time, they affected the chitinous coat which tended to swell and dissolve if the eggs were then placed in distilled water or brine of strengths up to 15:1,000. Unless concentrations of sodium hypochlorite had been high or the action prolonged, an inner layer of the chitinous coat was resistant. This was observed in eggs at all stages of development. M.McK.

37—Rivista di Parassitologia.

a. DEIANA, S., 1957.—" La coli-tiflite parassitaria degli equini. I. I parassiti dei generi *Strongylus*, *Poteriostomum* e *Triodontophorus*." **18** (1), 5–12. [English summary p. 11.]

(37a) In 108 Sardinian horses suffering from typhlitis of the colon the incidence of intestinal helminths was: *Strongylus vulgaris* 100%, *S. edentatus* 80%, *Triodontophorus serratus* 22·2%, *T. brevicauda* 3·7%, *T. tenuicollis* 2·7%, *Poteriostomum imparidentatum* 2·7%. The males and females of *T. serratus* were smaller than those reported by Looss (1900) from Egypt and by Theiler (1924) from South Africa but agree with those given for *T. intermedius* by Sweet (1909) and Boulenger (1916). R.T.L.

38—Scottish Agriculture.

a. DUNN, E., 1957.—" Cereal root eelworm." **36** (3), 146–148.
b. THOMSON, D. & CORNER, H. H., 1957.—" Rotational grazing of ewes and lambs in Roxburgshire." **36** (4), 205–207.

(38a) Although the occurrence of *Heterodera major* as a pest in oats in Britain has been known since 1908, many farmers are unaware that it is a cause of poor or indifferent crops. Dunn therefore outlines the life-cycle of this eelworm and describes the symptoms to which the infection gives rise. Losses are difficult to assess but in the Lothians the yield in one instance fell from 96 to 12 bushels per acre after oats had been sown for three years in succession. Other host crops are barley, wheat and rye. As many grasses, including Italian and perennial ryegrass, cocksfoot, meadow fescue, timothy and wild oat are susceptible, grassing down is not recommended. Cereals should only be grown at intervals and followed by roots, lucerne or peas. R.T.L.

(38b) Rotational grazing experiments, in Roxburgshire, carried out over a period of three years gave double the output of live-weight of lambs per acre compared with free-range. The degree of worm infestation was much reduced. Shifting the ewes and lambs after two or three days gave better results than after five days. In spite of the extra labour and other practical difficulties involved, rotational grazing on a field scale appeared to be worth while. It is suitable for smaller farms if necessary precautions are taken. R.T.L.

39—South African Journal of Science.

a. ANON., 1957.—" Bilharziasis in Africa." [Editorial.] **53** (7), 191.

40—South African Medical Journal.

a. DE MEILLON, B., 1957.—" Infestation by *Fasciola hepatica*." [Correspondence.] **31** (3), 64.

(40a) In a recent survey of mine recruits from a coastal area [unspecified] in South Africa the faeces of 40 out of 120 contained eggs morphologically similar to those of *Fasciola hepatica*. Several earlier cases, recorded in the Annual Reports of the South African Institute for Medical Research, are cited. R.T.L.

41—Technical Bulletin. Ministry of Agriculture, Fisheries and Food. London.

a. GOODEY, J. B., 1957.—" Laboratory methods for work with plant and soil nematodes." No. 2, 3rd edit., iv+47 pp.

(41a) The scope of this Technical Bulletin has been greatly widened to include modifications of some of these described in the earlier editions and many new techniques and apparatuses, including Seinhorst's quantitative method of soil extraction, Oostenbrink's elutriator, Winslow's apparatus and Hesling's elutriator and aspirator. The sections on processing, culturing, mounting and drawing nematodes are considerably expanded. There is a supplementary list of references to other techniques and equipment. The bibliography now includes 106 titles. The text is illustrated by 14 figures and eight half-tone plates. R.T.L.

42—Tidskrift för Lantmän.

a. EKHOLM, S., 1957.—" Nematodbekämpning och nematodforskning." **38**, 37–38.

(42a) This is a popular review of nematodes as parasites of agricultural crops. The potato-root eelworm is known in six different areas in Finland and soil sampling will be intensified to facilitate its control. S.B.

43—Tidsskrift for Planteavl.

a. BOVIEN, P., 1957.—" Plantesygdomme i Danmark 1954. 7. Skadedyr på landbrugsplanter. 8. Skadedyr på havebrugsplanter." **60**, 579–592. [English summary pp. 604–609.]

(43a) In Denmark severe attacks by *Heterodera major* were reported in oats and barley and also in wheat in many districts. *Heterodera schachtii* was mentioned in reports from eight districts. In a few fields swedes suffered from infestation. Infestations by *Heterodera rostochiensis* are wide-spread in gardens and on allotments but are rare where a reasonable crop rotation is applied. *Ditylenchus dipsaci* was reported from red clover, white clover and lucerne but the damage was generally moderate. Shallots were, for the first time in Denmark, found to be infested. Infestations by *Aphelenchoides* spp. in strawberries are common in most parts of the country and the damage is often considerable. S.B.

44—Tijdschrift voor Diergeneeskunde.

a. GROOTENHUIS, G., 1957.—" Over de bestrijding van strongylosis en ascariasis bij het paard." **82** (1), 16–22. [English, French & German summaries pp. 21–22.]

(44a) In the Zeeland province of the Netherlands worm infections in horses are widespread and severe, especially in foals. When administered by nasal sound and in the fodder, phenothiazine was found to be particularly effective against strongyles, and carbon disulphide gave excellent results against ascarids, when the faeces were examined four weeks later. To demonstrate the presence of eggs in faeces the samples should be steeped in 0·5 N caustic soda solution and afterwards shaken vigorously. R.T.L.

45—Transactions of the American Microscopical Society.

a. HARGIS, Jr., W. J., 1957.—" Monogenetic trematodes of Gulf of Mexico fishes. Part XIII. The family Gastrocotylidae Price, 1943 (continued)." **76** (1), 1–12.
b. MONTGOMERY, W. R., 1957.—" Studies on digenetic trematodes from marine fishes of La Jolla, California." **76** (1), 13–36.
c. COIL, W. H., 1957.—" *Parastrigea mexicanus* sp. nov., a strigeid trematode from the avocet." **76** (1), 70–72.
d. GUMBLE, A., OTORI, Y., RITCHIE, L. S. & HUNTER, III, G. W., 1957.—" The effect of light, temperature and *p*H on the emergence of *Schistosoma japonicum* cercariae from *Oncomelania nosophora*." **76** (1), 87–92.

(45a) Continuing his study of the morphology of the monogenetic trematodes of fishes in the Gulf of Mexico Hargis describes, from the gills of *Chloroscombrus chysurus*, *Amphipolycotyle chloroscombrus* n.g., n.sp., a new genus of Gastrocotylinae characterized by the possession, among other features, of two different types of clamps, viz., those in long row, large, open, much modified and sessile and those in short row, small and closed, apparently with clamp-like action and pedunculated. The cirrus is armed with a corona of curved spines. The diagnosis of Vallisiinae is emended to contain the genera *Vallisia*, *Vallisiopsis*, *Protomicrocotyle* and *Lethacotyle*. *Vallisia oligoplites* n.sp. from *Oligoplites saurus* has only seven clamps, three on the anterior and four on the posterior edge of the opisthaptor. The genera *Allodiscocotyla* and *Pseudomazocraes* are emended. *P. selene* n.sp. from *Selene vomer* differs from *P. monsivaisae* in having smaller clamps placed on the right instead of the left side and a centre piece forked at both ends. The genital atrium is not papillated and the anchors are slightly different in shape. R.T.L.

(45b) About 40 species of digenetic trematodes were collected from fish caught at La Jolla, California; 22 are reported in this paper and of these, 11 are new including five new genera of which three belong to Waretrematidae, viz., *Scorpidicola californiensis* n.g., n.sp., from *Medialuna californiensis*, which differs from *Megasolena* as it lacks lymphatic vessels, the acetabulum is pedunculate and papillate, the two testes have undulating borders and the eggs are filamented. Young specimens have one testis. *Myodera medialunae* n.g., n.sp., from *M. californiensis* differs from *Scorpidicola* in having conspicuous muscle bands in the forebody, a uroproct and a single testis even in the adult. *Vitellibaculum girella* n.g., n.sp., from *Girella nigricans* differs from *Megasolena* in having a spined body, a seminal receptacle, three pairs of lymphatic vessels and in the shape of the vitellaria arranged in dorso-ventrally placed bands. The species *Spiritestis arabii* Nagaty, 1948 is transferred to Waretrematidae from Lepocreadiidae. A new addition to Hemiuridae is *Myosaccium ecauda* n.g., n.sp., from *Sardinops caerulea*. It is closely related to *Aphanurus* but has two compact vitelline masses, no pars prostatica and a thick muscular prostatic vesicle. The seminal vesicle extends behind the acetabulum. The eggs are filamented. *Pellamyzon sebastodis* n.g., n.sp. from *Sebastodes serriceps* and *S. atrovirens* belongs to the Opecoelidae; it is similar to *Podocotyle* but differs mainly in having a large conical acetabulum and two ani. The six new species described are *Diphterostomum macrosaccum* n.sp. from *Neoclinus uninotatus*, *Dollfustrema californiae* n.sp., from *Gymnothorax mordax*, *Genitocotyle heterostichi* n.sp. from *Heterostichus rostratus*, *Genolinea tanyopa* n.sp. from *Medialuna californiensis* and *Hypsypops rubicunda*, *Neolepidapedon. medialunae* n.sp. from *Medialuna californiensis* and *Opechona occidentalis* n.sp. from *Sebastodes atrovirens*. *Opechona xesuri* Yamaguti, 1940 is transferred to *Lepocreadium*. There are also thirteen new host records and one new geographical record. R.T.L

(45c) *Parastrigea mexicanus* n.sp. described and figured from the avocet, *Recurvirostra americana*, is similar to *P. robusta* but differs in that the vitellaria are present over most of the ventral surface of the posterior segment extending laterally towards the dorsum, and the genital cone is very weakly developed. R.T.L

(45d) There is an abrupt increase in the number of *Schistosoma japonicum* cercariae discharged when *Oncomelania nosophora* are transferred from total darkness to light. Emergence was suppressed between 6°C. and 10°C., increased but delayed at 12°C. to 15°C. and increased further at 20°C. to 23°C. reaching a peak at 26°C. to 28°C. At 30°C. to 35°C. the cercariae were distorted and shrivelled. There was extensive shedding of cercariae at a *p*H of 6·0 but the numbers were reduced at a *p*H of 8·0. It is concluded that under natural conditions *p*H is not a critical factor. R.T.L.

46—Transactions of the Royal Society of Tropical Medicine and Hygiene.

a. SEATON, D. R., 1957.—" Treatment of tapeworm infection with dichlorophen." [Demonstration.] **51** (1), 2–3.
b. KERSHAW, W. E., 1957.—" The population dynamics of *Onchocerca volvulus* in the vector, *Simulium damnosum*." [Demonstration.] **51** (1), 4.
c. FURNELL, M. J. G. & KERSHAW, W. E., 1957.—" An outbreak of trichinosis in man in Limerick, in 1956." [Demonstration.] **51** (1), 4.
d. KERSHAW, W. E. & WILLIAMS, P., 1957.—" The effect of filariasis on exercise tolerance in the cotton-rat." [Demonstration.] **51** (1), 4.
e. CRISP, G., 1957.—" The distribution of *Simulium damnosum* in the Gold Coast." [Demonstration.] **51** (1), 4.
f. LAVOIPIERRE, M. M. J., 1957.—" A note on the escape of the infective forms of *L. loa* from the head of *C. silacea*." [Demonstration.] **51** (1), 5.
g. WEBBER, W. A. F., 1957.—" An improved technique for the filtration of microfilariae from venous blood, and a method of recovering the microfilariae alive." [Demonstration.] **51** (1), 5.
h. NICHOLAS, W. L. & HYNES, H. B. N., 1957.—" The life-cycle of *Polymorphus minutus* (Acanthocephala), a parasite of the duck and other birds." [Demonstration.] **51** (1), 9.
i. SOULSBY, E. J. L., 1957.—" Antigenic analysis of *Ascaris* tissues by the double diffusion precipitin test." [Demonstration.] **51** (1), 9–10.
j. DUKE, B. O. L., 1957.—" The reappearance, rate of increase and distribution of the microfilariae of *Onchocerca volvulus* following treatment with diethylcarbamazine." **51** (1), 37–44.

k. MYNORS, J. M., 1957.—" Intestinal schistosomiasis resembling regional ileitis." **51** (1), 45–47.
l. DUKE, B. O. L. & HAWKING, F., 1957.—" The effect of anaesthetics on the migrations of the microfilariae of *Loa loa*." [Correspondence.] **51** (1), 88–90.
m. NELSON, G. S. & HEISCH, R. B., 1957.—" Microfilariae like those of *Wuchereria malayi* in dogs and cats in East Africa." [Correspondence.] **51** (1), 90.
n. YOELI, M., 1957.—" The problem of filariasis among Indian Jews in Israel." **51** (2), 125–131.
o. YOELI, M., 1957.—" Observations on agglutination and thigmotaxis of microfilariae in bancroftian filariasis." **51** (2), 132–136.
p. ROWLAND, H. A. K., 1957.—" The test of cure in urinary schistosomiasis." **51** (2), 157–162.

(46a) Dichlorophen, at the recommended single dose of 0·5 gm. per 16lb. body-weight, cured 9 out of 14 cases of infection with *Taenia saginata*. It is better than filix mas but less efficient than mepacrine. Some of the patients had slight colic and looseness of the bowels for 12 hours after taking the treatment. As the drug not only kills but also digests the tapeworms, it is only from the failure of segments to reappear in the faeces for three months that a cure can be assumed. R.T.L.

(46b) Kershaw states that the fate of populations of microfilariae ingested by Simulium feeding on Onchocerca infections of different intensities can be followed by constructing frequency distribution curves of the numbers of Onchocerca larvae surviving in different stages of development. About one-tenth of the ingested microfilariae reach the infective form. R.T.L.

(46c) Three cases of trichinosis, of which one proved fatal, occurred in Limerick in September, 1956. 10 out of 136 rats caught on the city dump were also infected. R.T.L.

(46d) Physical fitness in uninfected cotton-rats is inversely related to body-weight. Preliminary experiments indicate that this basic relation is not affected by a filarial infection. R.T.L.

(46e) On the Gold Coast *Simulium damnosum* has a limited distribution except in the Northern Territories where it occurs along all the main rivers and on tributaries which flow only for a few weeks annually. In the Gold Coast colony it is confined to the Volta river north-east of Accra. In Ashanti it is present around Kintampo. R.T.L.

(46f) Sections of the head of *Chrysops silacea* infected with *Loa loa* show that some larvae escape, during feeding, via the labella and the biting fascicle. Most escape through the labiohypopharyngeal membrane which is probably ruptured by the increased intracranial pressure during the act of biting and by the activity of the larvae in the sub-cibarial haemocoelic space. R.T.L.

(46h) Although the records of *Polymorphus minutus* in ducks in Britain are few, the widespread infection of the intermediate host *Gammarus pulex* depends on the presence of infected wild birds. In some localities, however, ducks do suffer from heavy infections. The various stages in the development of the parasite were demonstrated. R.T.L.

(46i) Soulsby describes the technique followed by him in preliminary investigations into the antigenic structure of *Ascaris lumbricoides*. R.T.L.

(46j) Ten Onchocerca volunteers submitted to a course of diethylcarbamazine sufficient to destroy the microfilariae. Multiple skin snips were examined before and at intervals of 3 to 13 months after the treatment. In the majority of the volunteers the microfilarial density by the end of a year after treatment had reached over half the pre-treatment density. It is suggested that a heavy initial course of treatment should be followed by daily or weekly doses in order to keep down the microfilarial density without incurring unpleasant reactions. R.T.L.

(46k) A Sudanese case of intestinal schistosomiasis mansoni with lesions resembling regional ileitis was treated by resection and anastomosis. R.T.L.

(46l) There was a sharp fall by 28% to 54% in the microfilarial count of the peripheral blood in three cases of *Loa* infection when a general anaesthetic was administered for surgical operations. Hawking's earlier observations are therefore confirmed. R.T.L.

(46m) Nelson & Heisch record the discovery on Patta Island off the coast of Kenya of a sheathed microfilaria, of the *Wuchereria malayi* type, in seven out of twelve cats and one out of four dogs. Unsheathed microfilariae were also present in cats and dogs and sheathed microfilariae (species unknown) in two out of ten donkeys. The monkeys *Cercopithecus aethiops* are infected with *Dirofilaria aethiops*. The blood of the natives is infected with *Wuchereria bancrofti* but not with *W. malayi*. R.T.L.

(46n) Since 1949, 2,200 Malabar Jews have settled all over Israel but mainly in ethnically homogeneous villages in the hilly regions in the Ramleh area and in the Negev. The incidence of *Wuchereria bancrofti* in the 878 examined was 11·6%. The infections had apparently been acquired in the early years of life in Malabar. Dissection of *Culex molestus* showed, for the first time in Israel, that this mosquito was a natural vector of *W. bancrofti*. This was confirmed by laboratory experiments of which 65% to 82·3% were positive. No microfilariae were found in the nocturnal blood of 619 Europeans among whom Malabar immigrants had settled although local conditions for the transmission of filariasis were favourable. Treatment with hetrazan in doses of 2 mg. per kg. body-weight, three times daily for two weeks, resulted in a total suppression of microfilariae for three-and-a-half months in 15 Indian Jewish carriers. It is concluded that the risk of the spread of filariasis under the prevailing conditions of settlement in Israel is small. R.T.L.

(46o) The microfilariae in venous blood from *Wuchereria bancrofti* carriers agglutinated in "Medusa head" and "Sunflower" masses with the tails of the microfilariae directed towards the centre. This phenomenon was dependent on the amount of anticoagulant in the blood. In three out of four cases the injection of 60 mg. of heparin intravenously resulted in a partial release of microfilariae into the blood during the daytime. The relation of the agglutinating phenomenon to filarial periodicity is discussed. R.T.L.

(46p) Comparison of the results of urine microscopy, hatching tests and rectal biopsy in assessing the effect of trivalant sodium antimony gluconate on cases of schistosomiasis indicates that before three months after treatment little is gained from hatching tests. Microscopy is more reliable than hatching tests but if the latter are included they need not be carried out during the first three months. Rectal biopsy is of no value in assessing a cure. As the majority of relapses occurred before the fourth month a follow-up for six months is adequate. R.T.L.

47—Växtodling. Uppsala.

a. BINGEFORS, S., 1957.—" Studies on breeding red clover for resistance to stem nematodes." **8**, 123 pp. [Swedish summary pp. 113–116.]

(47a) This comprehensive account covers many aspects and is presented under the following main headings: Attacks and damage by the clover nematode; Material and methods; Resistance to stem nematode in red clover varieties; Investigations on methods of infection and selection; Breeding of red clover for resistance to stem nematode; Investigations on the inheritance of resistance; Investigations on the nature of resistance; Some investigations on biologic races in *Ditylenchus dipsaci*. The aim in practical breeding was to combine winter-hardiness with resistance. Comparisons were always made with "Merkur" (very resistant) and "Ultuna" (susceptible). A susceptible red clover plant is defined as one into which nematodes can penetrate and reproduce to increase their number or at least keep it constant. A plant is resistant when the nematodes, which can usually penetrate it, do not reproduce enough to keep their numbers constant. *Medicago glutinosa* and *M. orbicularis* are new host records of *D. dipsaci*. The work is illustrated by sixteen photographs, thirty-two text figures and forty-nine tables. J.B.G.

48—Veterinaria Italiana.

a. AMBROSI, M., 1957.—"Sopra un caso di echinococcosi polmonare da echinococco multiloculare o alveolare nel bovino." **8** (1), 65–70.

(48a) Ambrosi describes, with three photographs, the histology of an *Echinococcus multilocularis* cyst taken from the lung of one of the cattle slaughtered at Perugia, Italy. M.McK.

49—Veterinariya.

a. VASILEV, A. A., 1957.—[Treatment of disease of ducks and geese caused by Hymenolepididae.] **34** (1), 43–46. [In Russian.]
b. LUKASHENKO, N. P., 1957.—[The diagnosis of trichinelliasis in live pigs by allergic and serological reactions.] **34** (2), 31–32. [In Russian.]
c. SHUMAKOVICH, E. E., 1957.—[Present day problems in the control of helminthiasis in farm animals.] **34** (4), 33–38. [In Russian.]
d. BORODINA, V. V., 1957.—[Conditions and ways in which sheep become infected with *Dictyocaulus*.] **34** (4), 38–40. [In Russian.]
e. BAZDIREV, K. P., 1957.—[Anthelmintic properties of phenothiazine-salt blocks.] **34** (4), 41–43. [In Russian.]
f. AKRAMOVSKI, M. N., EGOROV, Y. G. & BASHKIRTSEVA, E. V., 1957.—[Testing arsenic preparations against monieziasis in sheep.] **34** (4), 43–44. [In Russian.]

(49a) A number of anthelmintics were tested on 1,194 ducks and 586 geese in order to obtain an easily accessible, effective and little toxic treatment against hymenolepidids. Filixan (in boluses made with wheat and water) was highly effective and was non-toxic in doses of 0·3 gm. per kg. body-weight for ducks and 0·4 gm. per kg. for geese. In ducks the intens-efficacy and extens-efficacy were both 100%, in ducklings 98·5% and 83·3%, in geese 94·1% and 90% and in goslings 92% and 73·7%. Filixan given with feed in doses of 0·35 gm. per kg. for ducks and 0·45 gm. per kg. for geese cured all the birds. In geese satisfactory results were also obtained with 50–60 gm. per bird of defatted gruel from pumpkin seeds (intens-efficacy 81·2%, extens-efficacy 36·6%), with 0·2 gm. per kg. of male fern extract (89% and 80%) and with 0·001 gm. per kg. of plant arecoline (86·5% and 86·6%). Synthetic arecoline, tin arsenate, aminoacridine and gruel from garlic and from defatted melon seeds were ineffective and/or toxic. G.I.P.

(49b) Of the four Trichinella antigens tested in preliminary experiments on rabbits and guinea-pigs, the acid-soluble protein fraction was the most sensitive and specific. In experimentally infected pigs, intradermal injection of 0·1 ml. of this antigen in 1:10,000 dilution gave 100% positive reactions from the 21st to the 135th day after infection. The precipitin reaction on Trichinella larvae *in vitro* was highly sensitive and specific. It became positive on the 12th–17th day after infection but is less convenient to use. The ring precipitation and flocculation reactions were less effective. G.I.P.

(49d) Contrary to Panusyak's observations [for abstract see Helm. Abs., **24**, No. 165d] Borodina has shown experimentally that infection of sheep with *Dictyocaulus filaria* during winter stabling is rare and therefore of no epizootic significance and that percutaneous infection does not occur. Between 1,500 and 2,150 two-day-old infective larvae were placed on 1 sq. cm. areas of shaven skin of three sheep. After 12 days a further 200 to 300 three-day-old larvae were added. The skin patch was kept moist. All three sheep remained uninfected. Borodina has also shown that of the infective larvae put in faeces directly on the soil and left throughout the winter some were still viable and able to infect mice in the spring, although all non-infective larvae had been killed. The same results were obtained in two successive winters, in one a heavy fall of snow was followed by 40°C. of frost and in the other the fall of snow was preceded by a period of 20°C. of frost. G.I.P.

(49e) To ensure the intake by sheep of the prophylactic dose of phenothiazine against *Haemonchus* and *Dictyocaulus* as well as the necessary amount of salt, 6·5 gm. per sheep of a 1 : 12 phenothiazine-salt mixture (equivalent to about 0·5 gm. of phenothiazine per sheep) should be given daily. Phenothiazine-salt blocks are advocated as the most convenient form of the salt for transport, storage and use. G.I.P.

(49f) The arsenates of aluminium, tin, iron (both bivalent and trivalent) and zinc in doses of 0·02–0·5 gm. per sheep, copper arsenate in doses of 0·05–0·5 gm., Paris green in doses of 0·1–0·5 gm. and calcium arsenate in doses of 0·1–2·0 gm. were non-toxic to two to six-months-old lambs. Depression lasting eight hours was observed in one lamb, which had received 2 gm. of calcium arsenate. All the metal arsenates tested against monieziasis in 50 lambs at doses of 0·3–0·5 gm. per animal, gave complete cure, causing the elimination of both mature and immature worms. 100% efficacy was also obtained in 86 lambs with Paris green at the dosage of 0·1 gm. for two-months-old, 0·2 gm. for three to four-months-old and 0·3 gm. for five to six-months-old lambs, and in 214 lambs with calcium arsenate in the dosage of 0·3 gm., 0·4 gm. and 0·5 gm. respectively, given after a 12-hour hunger diet. G.I.P.

50—Veterinary Medicine.

a. NEWTON, W. L. & WRIGHT, W. H., 1957.—" A reevaluation of the canine filariasis problem in the United States." **52** (2), 75–78.
b. ROGERS, R. L., BROOKS, F. N. & HIGGS, B. F., 1957.—" Toxicological studies following massive dose of phenothiazine to a calf." **52** (5), 219–224.
c. SHUMARD, R. F. & EVELETH, D. F., 1957.—" Piperazine citrate as an anthelmintic in sheep." **52** (5), 225–229.
d. STONE, R. M., 1957.—" Canine parasitism in the Detroit, Michigan area." **52** (5), 244–245.

(50a) *Dirofilaria immitis* was the only filariid worm known in the dog in the U.S.A. until 1956 when Newton & Wright reported a second species of which they now give a fuller account. This new worm, identified as *Dipetalonema* sp., differs in many respects from *Dirofilaria immitis* and resembles *D. reconditum* but the microfilaria in the peripheral blood measures only 269 μ to 283 μ. Its tail is sharply pointed and, in formalin, ends in a curved buttonhook-like manner. It does not develop in *Anopheles quadrimaculatus* but reaches the infective stage in the cells of the fat body of *Ctenocephalides canis* and *C. felis*. The length of the adult male is about 17 mm. and that of the female approximately 31·5 mm. They live in the connective tissue immediately beneath the skin. The morphological differences and other characteristics of the adults and microfilariae of *Dipetalonema* sp. and *Dirofilaria immitis* are tabulated. R.T.L.

(50b) Analyses of blood, faeces and urine, changes in weight and clinical observations were made on a calf weighing 268 lb. which had received a total of 436·5 gm. of phenothiazine. There was no evidence of haemolysis or any significant alteration in blood values. 92·71% of the phenothiazine was recovered from the faeces and urine. There were indications of drowsiness four hours after dosing, inco-ordinated movements at 7 hours 50 minutes, and at 8 hours 25 minutes the calf suddenly collapsed. Clonic spasms lasting for three to five minutes appeared 9, 10½ and 12½ hours after dosing and the animal remained recumbent and semi-comatose, but between the 25th and 48th hour there was definite improvement. Two definite symptomatic phases were observed. Symptoms of primary toxicity which developed from the fourth to between the 36th and 48th hour and those of secondary toxicity beginning at about the 60th hour indicated severe gastro-intestinal intoxication and reduced movements of the rumen and intestines. Subsequent increase in weight indicated that no permanent damage had resulted. R.T.L.

(50c) When 250 to 450 mg. of piperazine citrate per kg. body-weight was given to lambs in drinking water over a period of 24 or 48 hours it proved highly effective against *Chabertia*, *Bunostomum*, *Nematodirus* and *Oesophagostomum* but not against *Haemonchus*, *Trichostrongylus* or *Trichuris*. Tabulated data show that drenching is less effective owing to the relatively large concentration of the drug in one portion of the gut. R.T.L.

(50d) Stone tabulates the number of times the eggs of ascarids, hookworm and whipworm were found by sugar flotation of faeces of dogs seen in clinical practice in Detroit during each of the four quarters of two successive years. A continuous fall in the number of instances of ascarid infection is attributed to his refusal to vaccinate any puppy for distemper unless pre-

viously examined and, if necessary, treated for parasites. The incidence of hookworms remained more or less constant, but whipworm infections ranged from 18% to 48% in different quarters of the year. R.T.L.

51—Veterinary Record.

a. GIBSON, T. E., 1957.—" New records of nematodes from British cattle." [Correspondence.] **69** (2), 42.
b. ANON., 1957.—" Bovine cysticercosis." **69** (4), 66.
c. THORNTON, H., 1957.—" The incidence of *Cysticercus bovis* in Persia." [Correspondence.] **69** (5), 102.
d. POYNTER, D., 1957.—" Developments in equine parasitology." **69** (12), 356, 379.
e. HORTON-SMITH, C. & LONG, P. L., 1957.—"*Ascaridia dissimilis* Vigueras, 1931, in British turkeys." **69** (15), 436.
f. ROSE, J. H., MICHEL, J. F. & HARRISS, S. T., 1957.—" Lungworms of British sheep." [Correspondence.] **69** (16), 461.

(51a) Gibson adds *Nematodirus spathiger* to Morgan & Soulsby's list of nematodes in British cattle. [For abstract see Helm. Abs., **25**, No. 308c.] It occurred in nine out of 14 cattle recently received for examination at Weybridge. R.T.L.

(51b) As bovine cysticerciasis is now being reported more frequently in Britain and other European countries there is need for closer co-operation between veterinarians, public health inspectors and medical officers of health to improve meat inspection techniques, sewage disposal methods and for increased publicity on the desirability of thoroughly cooking all meat and meat products. R.T.L.

(51c) In Persia the incidence of *Cysticercus bovis* is low in the dry arid region south of Teheran while in the well-watered, semi-tropical belt north of Teheran and between the Elburz Mountains and the Caspian Sea it may reach 50%. A fall in the incidence was reported from one of the slaughterhouses in the Caspian area of 40% to 2% in recent years and this has been attributed locally to the regular dosing of cattle with hexachlorethane or phenothiazine. R.T.L.

(51d) Poynter briefly summarizes some recent publications on the effectiveness of piperazine compounds against various intestinal helminths of horses. R.T.L.

(51e) Specimens of *Ascaridia dissimilis* collected from mammoth bronze turkeys at the Houghton Poultry Research Station, Huntingdon, have been identified by Dr. E. E. Wehr by the more median position of the fourth pair of ventral papillae of the male from that in *A. galli*. So far the occurrence of *A. dissimilis* in Britain has not been recorded. R.T.L.

(51f) The occurrence of *Neostrongylus linearis* in sheep is reported from Britain for the first time. The females are 13 mm. to 16 mm. long and resemble those of *Muellerius capillaris* but there is a cuticular expansion around the vulva. The males are 5·5 mm. to 6 mm. long with characteristically long and slender spicules while the telamon and gubernaculum are easily seen. The first-stage larva is about 260 μ long but its wavy tail and dorsal spine are very similar to those of *M. capillaris*. R.T.L.

52—Zeitschrift für Tropenmedizin und Parasitologie.

a. VON BRAND, T., 1957.—" Notiz über Glykogen und Lipoide in *Dioctophyme renale*." **8** (1/2), 21–23. [English summary p. 23.]
b. ENIGK, K., 1957.—" Erfahrungen mit der Aerosolbehandlung beim Lungenwurmbefall des Rindes." **8** (1/2), 54–59.
c. FAUST, E. C., 1957.—" Human infection with species of *Dirofilaria*." **8** (1/2), 59–68. [German summary p. 67.]
d. FUHRMANN, G., 1957.—" Zur Frage der Resorption und Ausscheidung von Piperazinsalzen." **8** (1/2), 83–90.
e. HALAWANI, A., ABDALLAH, A. & SAIF, M., 1957.—" Evaluation of the efficiency of miracil-D in the treatment of bilharziasis in Egypt." **8** (1/2), 134–140. [German summary p.140.]

f. HOEPPLI, R., 1957.—" Early Tahitian views on elephantiasis." 8 (1/2), 161–168. [German summary p. 167.]
g. MOHR, W., 1957.—" Zur Behandlung menschlicher *Schistosoma*-Infektionen." 8 (1/2), 185–192.
h. OYTUN, H. S., 1957.—" Hydatidose in der Türkei." 8 (1/2), 196–200.
i. PEÑA-CHAVARRÍA, A., LIZANO, C. & XIRINACHS, H., 1957.—" Uso del citrato de piperacina en la ascariasis de enfermos con fiebre tifoidea." 8 (1/2), 200–203. [German summary pp. 202–203.]
j. PIFANO, C. F. & PEDRIQUE, M. R., 1957.—" La cercaria-reacción de Vogel y Minning en el diagnóstico de la schistosomiasis mansoni." 8 (1/2), 203–207. [German summary p. 207.]
k. STUNKARD, H. W., 1957.—" Host-specificity and parallel evolution of parasitic flatworms." 8 (1/2), 254–263. [German summary pp. 261–262.]
l. THIEL, P. H. VAN, 1957.—" The infestation of the population of the Netherlands with *Enterobius (Oxyuris) vermicularis*." 8 (1/2), 270–274. [German summary pp. 273–274.]
m. VOGEL, H. & SCHUMACHER, H. H., 1957.—" Beobachtungen über alveoläre Echinokokken des Zentralnervensystems bei Versuchstieren." 8 (1/2), 278–287.

(52a) The very large amount of polysaccharide in a female *Dioctophyme renale* was identified as glycogen by paper chromatography. Smaller amounts of lipoids probably including one or more sterols were present. R.T.L.

(52b) Enigk redescribes his aerosol inhalation apparatus and its use with Askaridol for treating lungworm disease in ruminants [see Helm. Abs., **22**, No. 116a and **24**, No. 223b]. He recommends that a mucus liquifier be given with the Askaridol if large quantities of mucus are present in the lung, that a sedative be given to sheep, that calves be treated only if larvae are found in their faeces and that animals which cannot tolerate Askaridol should receive instead a 36% aqueous solution of piperazine succinate. During the fourth and early fifth stages the larvae in the lung are very resistant to treatment. Arising from this, about 10% of the cases manifest a considerable increase of larvae in the faeces two to four weeks after treatment and should be treated again immediately. Bacterial complications or vitamin A deficiencies should be suitably dealt with. Single treatments have resulted in cure or far-reaching improvement in 78% of 5,760 cattle. M.MCK.

(52c) Faust has made a revaluation of the 35 instances of *Dirofilaria* infection in man which have been reported and adds two new cases, one from Florida, the other from Thailand. The species *D. magalhaesi*, *D. louisianensis* and *D. spectans* are assigned to the subgenus *Dirofilaria* Faust, 1937 of which *D. immitis* is type. The *D. repens* reported from three cases and the majority of those recorded as *D. conjunctivae* are allocated to the subgenus *Nochtiella* Faust, 1937 but the worms from the other cases were immature or too poorly described to enable their systematic position to be defined. R.T.L.

(52d) The elimination of piperazine in the urine was measured in eight volunteers for 24 hours after they had received piperazine adipate or basic citrate equivalent to 1,000 mg. of anhydrous piperazine base. An average of $32{\cdot}1\% \pm 9{\cdot}5\%$ of the anhydrous piperazine base was eliminated after citrate administration and $33{\cdot}2\% \pm 8{\cdot}3\%$ after adipate administration, thus indicating no significant difference in the absorption of piperazine from either salt. The piperazine in the urine was determined by Fuhrmann's own method of photometric comparisons using a solution of borax, ethyl alcohol and the sodium salt of 1,2 naphthoquinone 4-sulphuric acid. M.MCK.

(52e) Of 530 ambulatory cases of urinary schistosomiasis 75·9% were apparently cured when examined six weeks after treatment with miracil-D hydrochloride in sugar-coated tablets at the dose rate of 200 mg., thrice daily for 20 days, irrespective of weight. The relapse rate, in a limited number of the cases followed up, was at least 18·7%. Of 34 intestinal cases due to *S. haematobium* and 53 cases of *S. mansoni* treated in the same manner in Cairo, the apparent rate of cure of *S. mansoni* after six weeks was only 37·7% although that of *S. haematobium* was slightly better. Of a further 61 cases of *S. mansoni* similarly treated in Damietta only 23 were negative after three months. Miracil-D hydrochloride is considered to be especially useful when antimony treatment is contra-indicated. R.T.L.

(52f) [The information given in this paper on early native views on elephantiasis in Tahiti is essentially the same as in *Proc. Alumni Ass. Malaya*, **10**, 3–13. For abstract see No. 34a above.]

(52g) Mohr reports on three methods of treating *Schistosoma mansoni* infections. Four patients (one also with *S. haematobium*) each received a total dose of 0·92–1·93 gm. of potassium antimony tartrate in 1% solution and all were cured but one, who had received only 0·59 gm., remained positive. The heaviest side effects were observed in this group possibly due to the original serious symptoms. Two out of four light infections were cured by a total dose of 15–65 c.c. each of fouadin, the remaining two could not be followed up. The four cases treated with a high total dose (15·2–19·0 gm.) of miracil-D were cured. The treatment lasted 13–16 days. This cure is, however, not suitable for mass treatment owing to the pronounced side effects. G.I.P.

(52h) 1955 statistics of the Turkish Ministry of Hygiene show that 220 of the patients in 27 hospitals in Turkey were infected with *Echinococcus unilocularis*; 150 of these were from Ankara. The age group most affected was from 25 to 44 years. *E. alveolaris* is less common; the eleven cases hitherto recorded from Turkey were spread throughout the country and were not restricted to areas as in Europe. G.I.P.

(52i) Twenty typhoid patients were cured of *Ascaris lumbricoides* infections after receiving 1·5–6·0 gm. of piperazine citrate, but some suffered from headache, slight giddiness and stomach pains. M.MCK.

(52j) Five members of a family became infected with *Schistosoma mansoni* while bathing at Tejerias (Aragua State) in an endemic area of Venezuela. The cercarial reaction of Vogel & Minning was positive from the fourth week after infection; intradermal tests with antigen from adult worms were positive after the cercarial reaction, and the eggs of *S. mansoni* appeared in the faeces 7–12 weeks after infection. As Pifano & Pedrique have found Vogel & Minning's reaction positive in 78% of 1,380 chronic cases of *S. mansoni* infection they recommend its use in routine diagnosis. M.MCK.

(52k) Stunkard summarizes the literature relating to host specificity and the parallel evolution of parasitic flatworms and their hosts, which has appeared since von Ihering first used evidence from parasites in discussing problems of dispersal of their hosts. It has been shown that taxonomic correlation between groups of parasitic flatworms and of their hosts is real and extensive. In the Cestoda host specificity is strict, each order of hosts whether mammalian, avian or piscine harbouring a distinct and characteristic fauna. Many of the Monogenea, which are exclusively parasites of aquatic vertebrates, appear to be specific for a single host and the fact that most are parasites of elasmobranchs indicates the antiquity of this group of flatworms. Among the Digenea host specificity is less rigorous but there is clear and abundant evidence of parallel evolution of hosts and parasites. There is a comprehensive bibliography. S.W.

(52l) Using 1,035 Naval recruits, mainly 19 or 20 years old, as a random sample of the Netherlands population, van Thiel found that an average of 32·2% was positive for *Enterobius vermicularis* when examined once by the Schüffner & Swellengrebel method. No significant differences were apparent in the incidence in those infected when classified under their trade or profession. R.T.L.

(52m) Infections of the central nervous system by *Echinococcus multilocularis* are rare in experimental mice as well as in man. Most of 188 experimentally infected mice developed *E. multilocularis* cysts in the liver. One *Microtus agrestis*, killed 39 days after infection with 2,000 eggs, presented apparently infertile cysts in the right cerebral hemisphere and another, which died 59 days after similar infection, had cysts embedded in the lumbar vertebrae and spinal cord. A detailed account illustrated by six photomicrographs is given of the histopathology of these two cases. M.MCK.

53—Zoologicheski Zhurnal.

a. BEREZANTSEV, Y. A., 1957.—[Contribution to the development and calcification of the *Trichinella* cysts.] **36** (2), 187–190. [In Russian: English summary p. 190.]

(53a) In rats and mice Trichinella cysts first show traces of calcification 14 months after infection. The pole of the cyst is the first part to be impregnated, thence calcification spreads but seldom involves the whole cyst. Completely calcified cysts still containing living larvae first appeared in a rat's muscle 23½ months after infection. In rodents completely degenerated cysts are found after two years. The rate of calcification fluctuates not only with the host species but also with the host's physiological condition. R.T.L.

NON-PERIODICAL LITERATURE

54—FENWICK, D. W., 1957.—" Red ring disease of coconuts in Trinidad and Tobago. Report." London: Colonial Office, 55 pp.

Fenwick describes investigations into *Aphelenchoides cocophilus* causing red ring disease in coconuts. The very low incidence of worms on the coconut weevil, *Rynchophora palmarum*, and the difficulty in removing them shed some doubt on the importance of this insect as a vector for the disease. The distribution of red ring tissue and of weevil damage is not consistent with the former arising from the latter. An almost constant feature of red ring infections is a mass of red ring tissue in the base of the tree with or without a cylinder of reddened tissue extending upwards for a varying distance. The breeding stages of the worm are always found near the top of the cylinder. This indicates that infestation of the trunk and leaves starts at the base. The presence of worms in the roots of infested trees (in two cases worms were found in roots of trees in which there was only very slight discoloration in the base of the trunk) and also of worms in the soil suggests entry via the roots. It is therefore possible that the disease is soil borne. This is supported by the fact that it appears to be more prevalent in swampy and badly drained areas. Dropped nuts suitable for planting were found to be infested with soil nematodes and in two cases *A. cocophilus* were found in the husks. This might be a factor in the spread of the disease to new areas. The disease normally affects trees less than ten years old but a few old trees were found dying from it. Symptoms in these trees were very variable and not at all typical of red ring in younger trees. The nuts on these trees were not infested. The symptoms of the disease in young trees are described—it is emphasized that diagnosis based on the general appearance of trees is uncertain—the presence of the characteristic reddened ring of tissue must be established and if possible confirmed by the presence of the worm. It is recommended that the status of the worm in soil be investigated, as well as its incidence in dropped nuts. The absence of basic knowledge on the culture and agronomy of coconuts is a severe handicap to any programme of research into red ring. D.W.F.

55—MOZLEY, A., 1957.—" Liver-fluke snails in Britain." London : H. K. Lewis & Co. Ltd., xii+55 pp.

This slim book is mainly an account of the author's personal experiences in searching for *Limnaea truncatula* in Great Britain. The wastefulness of indiscriminate broadcasting of copper sulphate against this vector of *Fasciola hepatica* is emphasized. Its use should be limited to the main habitats of this mollusc, viz., hoof-prints, ruts, roadside ditches, springs and seepages, small pools in hillside trickles of water, small pools in quarries and shallow depressions in pastures. Their snail populations are highly localized and each site has its own special conditions which determine their abundance. R.T.L.

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Cestoda: 13j, 22g, 22h, 24m.
Trematoda: 6b, 6c, 6d, 22i, 24j, 27f, 45a, 45b, 45c.
Nematoda: 6g, 13b, 13e, 13f, 13g, 13i, 22c, 22d, 24 l, 29d, 29f, 29h, 29k, 35a.
Acanthocephala: 6f, 24o.